

The Mining Journal

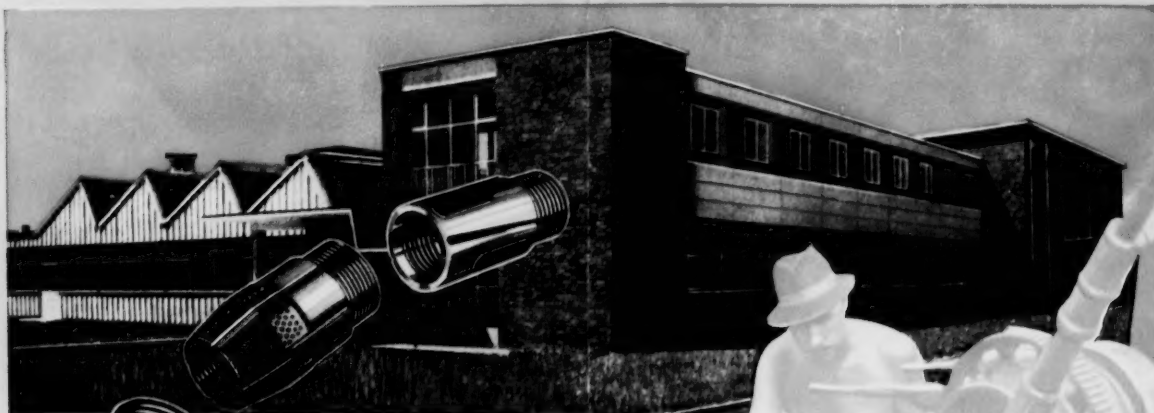
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Railway & Commercial Gazette

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LONDON, MAY 6, 1955

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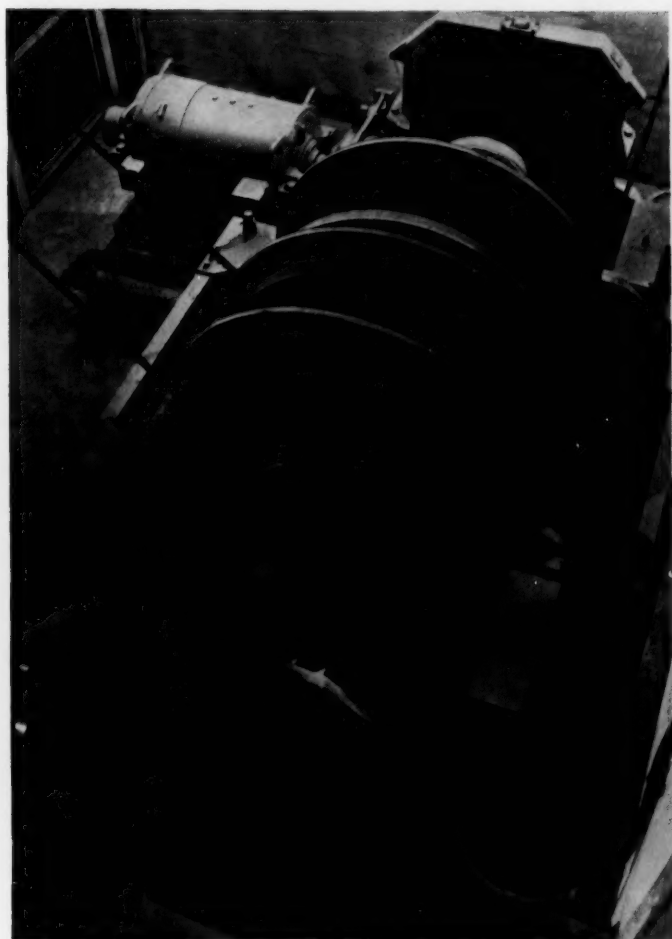
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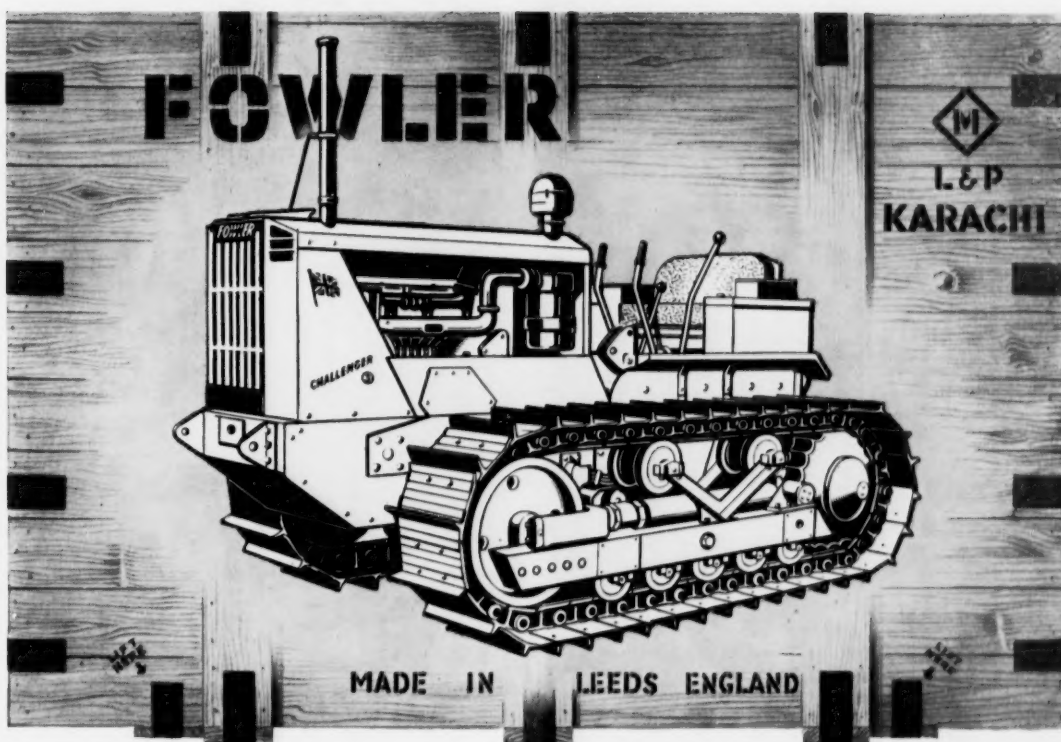
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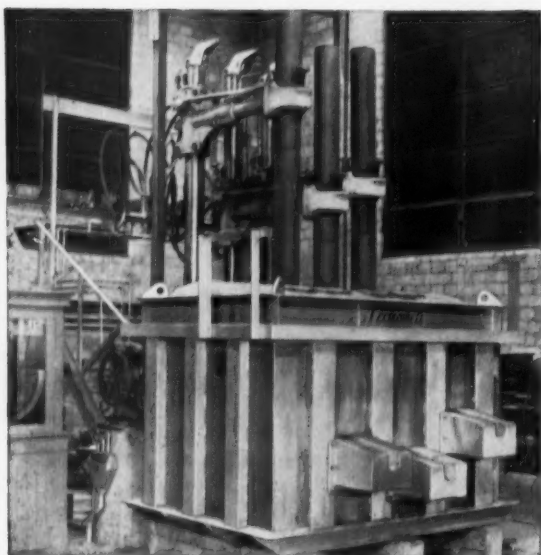


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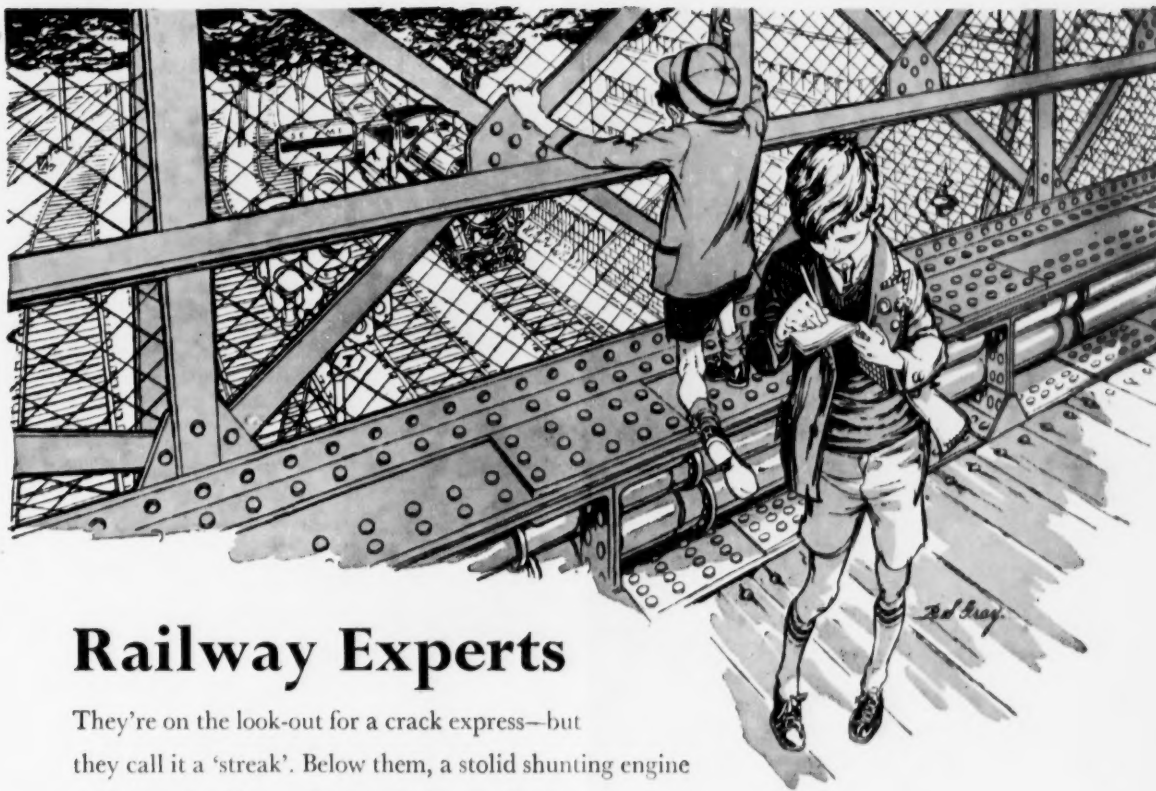
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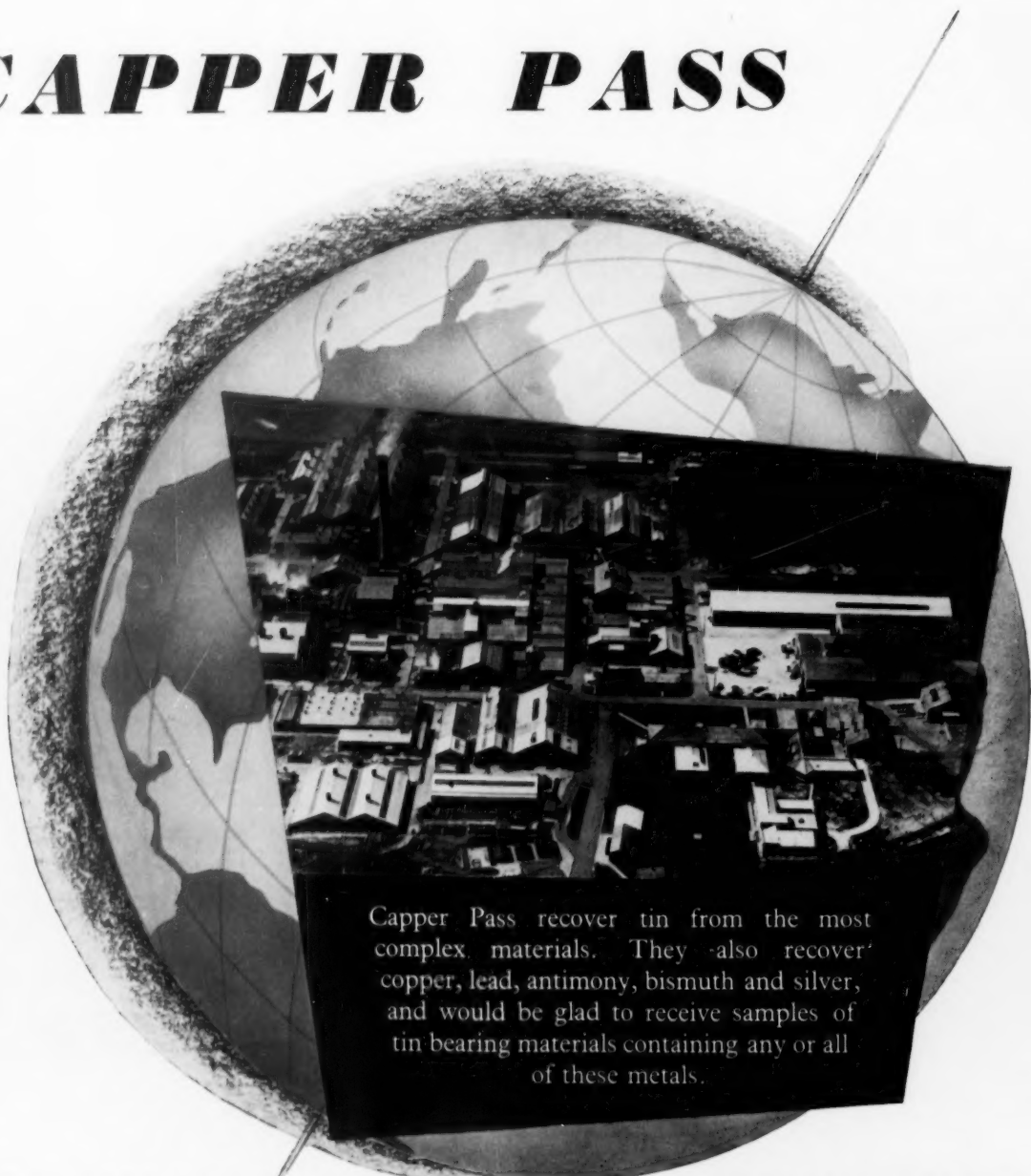
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NOTES AND COMMENTS

Further Moves to Stabilize Copper Prices

When the copper stabilization plan that was mooted around the turn of the year failed to gain acceptance Mr. Prain went out of his way to emphasize that he had not surrendered his hopes. Indeed, far from surrendering them, he has now brought them to fruition and three of the biggest British copper consumers I.C.I., British Insulated Callender's Cables, and Enfield Rolling Mills are to buy copper from Mulfulira and Roan Antelope at fixed prices. Whether any more consumers fall into line remains to be seen but already Rhokana and Nchanga have declared their adherence to a free market as at present represented by the London Metal Exchange.

The terms of the bargain are that the producers should offer copper at a price, yet to be announced, fixed for 30 days, that thereafter at 24 hours' notice it may be changed, and that after being changed it shall again be kept fixed for "a definite period." The consumers for their part must be "willing and able to instil a degree of stability into the resale prices for copper and brass products."

It is not unfair to say of the scheme that loose ends stick out all over the place; how could that be avoided at this stage? The producers' position seems tolerably clear. The consumers' looks much more difficult. How, for example, should consumers' price their own products at times when the fixed price diverges significantly from the L.M.E. price at which all three must still buy substantial quantities of the copper they require. (I.C.I., for example, has only recently made a long-term contract with Turkey to supply copper at a price based on L.M.E. averages.) Indeed if it is argued that prices cannot significantly diverge there is no purpose in the new pricing system.

Again, the Rhodesian producers are in the clear but is there anything in the common undertaking of the three consumers, however altruistic, that the Monopolies Commission might care to take a sniff at?

As for the duration of the scheme that too is indefinite; it will continue "until further notice, depending upon the circumstances in the copper market." This might be construed as meaning "when the L.M.E. begins to behave itself

and shows stability" and it would have been the logical construction if a definition of marketing had not been offered which renders the whole argument circular.

A "free market in the true sense of the word" it is stated is (*pace* all you economists) "where each industry or major producer from time to time names the price at which he will offer his product, determined on the basis of what he believes to be conducive to the promotion of consumption within the industry." But, in addition, another reason has been adduced as to why the L.M.E. should not price R.S.T.'s copper, which has nothing whatever to do with stability—namely that blister is not traded in on the Metal Exchange.

Thus although R.S.T. has abandoned the Exchange it is very far from clear on what conditions it would revert to it; and that, in fact, is the vital point.

It is not intended here to argue the merits of copper marketing for that was done at length in these columns on January 7 and January 28 when the problem first arose, and may be summarized as a belief that in the long run a properly functioning L.M.E. is in the best interests of both producers and consumers. All parties must co-operate to make it work, and what is most regrettable about the recent proposals is that they contain no suggestion for re-invigorating the Exchange.

The recent troubles of the industry are too often and too exclusively laid at the door of the L.M.E. and the strikes. The L.M.E., as everyone knows, has its shortcomings, but it is not responsible for supply and demand and it has succeeded in discharging its primary task of finding a price that would equate the two. Nor is it fair to put too much blame on the strikes. The American and Rhodesian strike losses have been made good by Governments without much altering the supply-demand situation.

What is clear is that, in early 1954 consumers were engaged in bearing copper—to their own detriment as it turned out—while subsequently the American producers misread the trend of their country's economy and hopelessly underestimated the strength of Europe's economy. In other words the prescience of producers and consumers in the past two years has not been such as to inspire confidence in their

ability to get along, in the best interests of the copper industry, without a professional market.

Convertibility "Too Hot" for the Electioneers

Nobody would think from reading the election manifestoes of the three political parties that it is commonly believed in Europe that, providing the Tories are returned, Britain, Germany, Holland, Belgium and possibly other countries will all declare their currencies convertible by mid-summer. The Liberals—who ought to be the most loyal supporters of convertible currencies—have nothing to say; the Tories do affirm their policy of making sterling strong but shun the word convertibility even as a long-term objective; the Socialists maintain a cautious silence. Yet, on the whole, and precisely because another step forward may be near, the politicians are probably right.

If the Tories were to promise convertibility they would lose votes from those who fear it would threaten full employment, while risking speculation against the pound. The Socialists, were they to announce the fiscal controls that Mr. Strachey has for long asserted would be necessary, would lose votes from those who dislike controls and would cause such a flight from the pound that they would be grateful indeed to lose the election.

Yet the fact remains that expectations are so strong and the present standing of the pound so anomalous that any future Government will be under severe pressure to make the pound sufficiently convertible for European countries to follow suit "five minutes after" as Professor Erhard has put it.

Twice in the past week the pound has stood at par with the transferable rate jogging on behind and with little evidence of official support; the sterling area as a whole is running a surplus; the pound has been in demand from Germany and particularly Russia; the terms of trade moved back favourably in March and since stocking up has been discouraged by the higher Bank rate even the United Kingdom's balance of payments should, by June, show appreciable improvement.

If the circumstances for making the plunge may appear propitious in mid-summer the arguments in favour of doing so will be compelling. There seems little purpose in bearing the cost of convertibility for those outside the sterling area—which is roughly the case to-day—without having the advantages of it. Furthermore, a solution of the most difficult technical problem—what to do with the European Payments Union—now appears at hand. The experts have recommended to the Council of Ministers that the Union should continue, but with deficits settled, 75 per cent in gold (as against 50 per cent now) and with a special fund for loans to countries which remain inconvertible. What is undeniable is that the present position of one pound convertible at an almost fixed rate for dollar holders and another pound fluctuating but supported for other non-sterling area holders is quite untenable over a long period. Convertibility may not be an overt issue at the election, but it is one that the election must decide.

No Nationalization of Indian Manganese Mines

A non-official resolution put forward in the Council of State, India, on April 15 last urging the nationalization of manganese mines in India received a large measure of support. But this recommendation was subsequently withdrawn after the Minister for Natural Resources and Scientific Research had declared that nationalization was impracticable under the existing circumstances, as there were many sectors of industry requiring government attention.

The Minister referred to the growing movement amongst the small manganese mine owners to form a Co-operative,

and he said that the Central Government would give all possible aid to such a scheme. In particular, support would be forthcoming for those Co-operative groups which had the plants necessary for upgrading inferior quality of manganese ore, as this was now one of the chief problems in the industry. In this connection he pointed out that there were one or two plants already installed for upgrading low grade ore and that another plant for the same purpose would soon be starting up.

The Rhodesias

(From Our Own Correspondent)

Salisbury, April 25.

The recent gift of £5,000 from the South African European Miners' Union to its counter part in Northern Rhodesia seems to be more of an embarrassment than an aid to the Copperbelt body. The general secretary of the South African union, Mr. Ellis, has been very vocal recently concerning African advancement on the Copperbelt.

European miners in the Union are concerned that the happenings in Northern Rhodesia will have a direct effect on working conditions in South Africa, and they appear anxious to support any stand which may be made by the European miners on the Copperbelt against African advancement. Surprise has been expressed in Kitwe that the Northern Rhodesian union should have accepted the financial gift from South Africa because the Northern Rhodesian European Mineworkers' Union is reputed to be the wealthiest trade union in Central and South Africa.

Sir Roy Welensky, deputy Prime Minister in the Federation, has bluntly stated that Mr. Ellis and the South African miners' union should mind their own business, while the leader of the Northern Rhodesia African Mineworkers' Union, Mr. Katilungu, has said that the South Africans' donation "to help fight against African economic progress in Northern Rhodesia will be answered by a united front of all African mineworkers in the territory and an echo of their reaction will be heard in the Union."

Meanwhile the Chamber of Mines in Northern Rhodesia has agreed to grant a guaranteed week (six days) to the European Mineworkers' Union. In addition, the union has had a meeting with the Rhokana Corporation over the Corporation's proposals to develop the Kansanshi mine, 120 miles north-west of Nchanga. The main point at issue is the Rhokana proposal that for the initial period of operation a fixed bonus of 20 per cent on basic Copperbelt rates be paid to workers. This has been rejected by the union which says that consideration might have been given to the proposal had the primary production of Kansanshi been other than copper.

MINING SPECULATION

One of the most spectacular rises of share prices on the Rhodesian and South African stock exchanges in recent years has been taking place within the last six months, and as a result a great deal of speculation has arisen in mining circles. The shares involved—those of Magundi Chrome Mines Ltd.—have risen from 7½d. (per 5s. share) in December, to 13s. in mid-April. A notice to shareholders recently issued has tended to increase the speculation on the company's future, as chrome mining ceased at Magundi in Southern Rhodesia last year.

The notice to shareholders announces a general meeting at which an increase in the nominal capital of the company from £100,000 to £500,000 will be proposed, and in addition it is proposed to change the name of the company to Magundi Copper Mines and Minerals Ltd.

The D.S.I.R. in 1953-54

In December, 1953, an agreement providing for the gradual expansion of the Department of Scientific and Industrial Research during the period 1954-59 was announced in the House of Commons. Its principal provisions are for an increase of staff over five years by 1,000, bringing the total in 1959 to about 5,100, an increase of about £900,000—roughly 20 per cent in the annual net vote of the Department over that period, and a building programme of about £6,000,000, the cost of which will be borne by the Ministry of Works. The initial effects of the agreement, which are discussed in the following article, are reflected in the D.S.I.R. Annual Report for 1953-54, which gives an impressive insight into the increasing activities of the Department. The estimates for 1954-55 provide for a net expenditure of £6,267,210, an increase of £578,379 over the provision for 1953-54.

Although the raw materials supply position has eased considerably, the importance of conservation and effective utilization still remains. The Division's surveys on pyrites cinders, selenium and germanium have stimulated action in industry. The erection of a plant for treating cinders is being actively considered. It is hoped that, on the basis of further work by the Chemical Research Laboratory, a significant addition to the country's supply of selenium will be possible.

The Department has set up a research study group to investigate ways and means of increasing the proportion of germanium recoverable from coal, which is undoubtedly the best indigenous source. On a longer-term basis, facilities available in the United Kingdom for research on mineral ore dressing, beneficiation and extractive metallurgy have been reviewed and suggestions have been made for increasing them.

The Department's interest in geochemical prospecting has increased. In September-October, 1953, a course was held at Imperial College at which about 60 geologists from the United Kingdom and other Commonwealth countries were given a grounding in geochemical prospecting methods. Following the course, and a symposium in which interested organizations participated, a small committee drew up proposals for a co-ordinated programme of research and development in geochemical prospecting to be carried out at Imperial College. These were submitted to the Colonial Office and the Special Grants Committee of the Department, who agreed to finance the programme on a 60/40 basis for a period of three years. Imperial College is also extending its laboratories for geophysics and geochemistry.

Work has been continued on a bibliography on size reduction (crushing and grinding) for industrial purposes, under the guidance of a committee of the Institution of Chemical Engineers.

GEOLOGICAL SURVEY

The Geological Survey of Great Britain continues to be actively engaged on exploration, mapping, examination of minerals, and related work. Nearly two-thirds of its field geologists have been doing revision survey in the coalfields and adjacent areas. This work involves the examination and recording of borehole and shaft sections and the provision of advisory service in geological matters for the National Coal Board. The area of revision survey completed during 1953 was 341 square miles, including 40 square miles in Northern Ireland.

North of Avonmouth, on the Bristol Channel, the National Coal Board has drilled five boreholes on the basis of a report by the Survey in order to find the thickness and distribution of certain coals known to occur in the area. A basin of Coal Measures has been proved, having a length from north to south of at least four miles and a maximum width of a little over a mile. This field is completely concealed by Triassic and alluvial deposits. As a result of advice given by the Geological Survey, the National Coal Board has proved by boring a small but hitherto unknown coal-field in Clackmannanshire.

The growing interest in commercial atomic power has

given a further impetus to prospecting for radio-active ores. A steady stream of specimens from supposed new discoveries of uranium and thorium ores has been submitted to the Survey laboratories by prospectors, mining houses and Government organizations, mostly from Commonwealth and Colonial territories. Approximately 2,800 minerals, concentrates and rocks were examined for radio-activity during the year.

Recent field studies in south-west England have revealed some hitherto unknown occurrences of uranium mineralization, but the total resources so far discovered in Britain are too small to support the high cost of a treatment plant.

OVERSEAS EXPLORATION

To assist exploration overseas, the Survey has collaborated with the Atomic Energy Research Establishment in the improvement of car-mounted Geiger and scintillometer equipment. Using a self-recording "Cargo" instrument mounted in a Land Rover vehicle, a radiometric survey traversing 8,000 miles of bush track and open veld in Bechuanaland and Swaziland was carried out by a G.S.M.-A.E.R.E. field party. Several regions were found which merit further investigation. This type of equipment has since been acquired by various official geological surveys and commercial mining interests. It is expected to prove a more satisfactory prospecting tool than similar aeroplane-mounted radiometric instruments.

The importance of chemical absorption in the geochemistry of sedimentary rocks has been emphasized by work on the uranium content of various phosphatic and carbonaceous deposits. In Nyasaland, for example, the remarkably high content of 0.73 per cent U_2O_5 was found. A high uranium content (0.08 per cent in the ash) has also been found in a thin coal seam encountered in the Warwickshire Coalfield, and similar uraniferous coals have been recognized from localities overseas. Typically these radio-active coals are thin and they usually form the topmost seam of a sequence overlain by red beds, acid volcanic ashes, or other strata from which uranium may be leached by downward percolating waters. It is believed that the coal absorbs the uranium either as a result of an ion-exchange mechanism or in the form of organo-metallic compounds. The uranium content in some foreign coals is high enough for the coal ash to form uranium ore.

Vanadium in bituminous materials, germanium in ores, and various rare metals in coal ash are among the elements now being determined quantitatively by spectrographic analysis. A new chemical method has been devised for the determination of ferrous iron.

DETERMINATIONS AND SEPARATIONS

Considerable interest has been shown by mining houses in the new chromatographic method developed by the Chemical Research Laboratory for the determination of niobium in low grade materials. The method involves a paper strip separation on to a specially designed paper sheet, which permits ten sample solutions to be dealt with simultaneously. The separated niobium is detected by spraying with tannic acid solution and determined by comparison with standard chromatograms.

Using a similar technique, field methods for the determination of a number of trace metals in soils have been developed. They are sufficiently simple, speedy and accurate to be suitable for geochemical prospecting, and in a number of instances have already been used in the field. Procedures have so far been worked out for the determination of copper, nickel lead, uranium, niobium and tantalum; a number of other metals are under investigation.

A relatively simple separation of the platinum metals—platinum, palladium, iridium and rhodium—has also been achieved with the aid of chromatography. Metals such as copper, cobalt and nickel are readily absorbed from aqueous solutions by cation exchange resins, but subsequent separation by selective elution with normal aqueous eluting agents is difficult. It has been found possible to obtain quantitative separation of cobalt or copper from nickel by using as eluting agents organic solvents such as simple ketone mixtures with hydrochloric acid. The behaviour of other metals in such systems indicates that it

will be possible to apply this technique to the separation of a number of other mixtures.

Research is being carried out on the purification of metals not already in the collection of pure metals maintained at the Chemical Research Laboratory. Attempts are at present being made to prepare pure rare earth metals; the separation of rare earths from one another is under investigation as a first step to obtain adequate supplies of the starting materials in a satisfactory degree of purity.

At the National Physical Laboratory an extension of the Metallurgy Division laboratories designed to accommodate the Ceramics, X-ray and new Radio-active Tracer Sections was formally opened by Sir Lawrence Bragg on April 6, 1954. The Radio-active Tracer Section is provided with facilities for carrying out on metals of all but the highest activity most of the operations normally undertaken in a research laboratory.

Systematic work on the constitution and properties of titanium alloys and of uranium alloys is being continued.

Synthetic Polyelectrolytes as Flocculating Agents

During investigations into the industrial applications of the synthetic polyelectrolytes, their use as flocculating agents has been proved particularly encouraging. Many kinds of suspended inorganic matter have been flocculated by low concentrations of polyelectrolyte, particularly in the presence of polyvalent ions. Depending upon the pH of the suspension and other conditions, various salts such as the sodium or ammonium salts may be the most suitable. The following article, based on investigations carried out by Monsanto Chemicals Ltd., describes the synthetic polyelectrolytes and their importance as flocculating agents.

The synthetic polyelectrolytes are carboxyl containing long chain polymers. In particular, RD 4054 is a white powder soluble to about 10 per cent in water, and soluble in some organic solvents. It is a free acid which is easily converted to various salts, while Lytron X-886 is a white powder soluble to about five per cent in water. Both materials dissolve slowly to give clear colourless solutions of high viscosity at concentrations of five per cent or more.

The polyelectrolytes react readily with suspensions of clay and other inorganic materials. In water solution they dissociate to give negatively charged particles and appear to form polymer bridges between the solid particles which bind together into large rapidly settling flocs.

FLOCCULATING PROPERTIES

The presence of polyvalent ions in the system not only facilitates the formation of these linkages, but appears to produce linkages of a stronger character. When using Lytron X-886 for the flocculation of slurries and suspensions, a greater rate and degree of flocculation is obtained when small quantities of such salts as aluminium sulphate or ferric chloride are added prior to the polyelectrolyte. Adjustment of pH by the addition of lime is often beneficial.

Excessively high concentrations of synthetic polyelectrolyte should be avoided because, apart from the unnecessary expense, they may cause peptization of the solids. The presence of high concentrations of organic matter tends to reduce the efficiency of flocculation, but the importance of this in any particular application is best determined by practical test.

Lytron X-886 is particularly suited for use in aqueous systems and functions excellently as flocculating agent where heavy metal precipitates are present or where heavy metal ions are capable of being absorbed by the suspended matter. Application in mineral washing is one of the several specific recommendations.

Under some circumstances it may be found that other derivatives may be better superior flocculating agents and

RD 4054 can also be supplied for conversion to the sodium, ammonium or other salt.

Lytron X-886 can also be used to modify the properties of clays. The most important applications are to achieve a higher moisture content without producing a sticky mass or to produce a drier mix at the same moisture content. A concentration of 0.05 per cent to 0.1 per cent is suggested, and the Lytron X-886 can be mixed with dry solids if suitable mixing equipment is available.

PREPARATION OF SOLUTIONS

In the preparation of Lytron X-886—five per cent solution, suspend five gm. of Lytron X-886 in 99 cc. of water and stir to disperse thoroughly. Allow to stand one-two hours to absorb water and dissolve by further stirring.

In the preparation of Sodium salt of RD 4054—five per cent solution. Add 10 gm. of RD 4054 to 90 gm. of water, stir to disperse and allow to stand for one-two hours. Stir until a uniform solution is obtained. To 10 parts of this 10 per cent solution add eight parts of a normal sodium hydroxide solution and two parts of water, and stir until solution is complete. The five per cent w/w resin solution obtained should have a pH of 8.1-8.4. If the pH is more than half a unit outside this range, it is recommended that it should be adjusted by the addition of fresh un-neutralized solution or sodium hydroxide solution.

To prepare ammonium salt of RD 4054—five per cent solution. Make a dilute solution of ammonia by diluting one part of 0.880 ammonium hydroxide solution with 90 parts of water by volume. Suspend five gm. of RD 4054 in 75 gm. of water and stir to disperse thoroughly. Allow to stand for one-two hours and add with stirring 20 gm of dilute ammonia prepared as above. The resin will slowly swell and dissolve in the ammonia solution.

This solution should have a pH of 7-8, and if a solution of pH 7 is required it is recommended that only part of the ammonia solution should be added initially, and a small quantity retained to allow for pH adjustment.

CUBA NICKEL—I

Nickel - Cobalt Resources of Cuba

The nickeliferous iron ores of Cuba are the largest potential sources of nickel in the world. The problems presented by their profitable exploitation and the progress of current exploration and development projects have been reviewed in *Report of Investigations 5099*, by W. D. McMillan and H. W. Davis, published by the United States Bureau of Mines. The following article, the first of two instalments, is a condensation of this report and describes the Cuba deposits together with the mining development methods used in their exploitation, while a concluding portion will discuss the treatment practice employed.

Since almost the beginning of the present century the bulk of the world's growing needs for nickel have been supplied by the sulphide ore deposits of the Sudbury district of Canada. In view of the higher demand resulting from the re-armament programme before the second world war, the U.S. Government considered that, despite the large increase in production in the Sudbury district, other types of deposits would have to be developed to meet requirements. Attention was therefore turned to Cuba because of its enormous reserves of nickeliferous iron ores, its nearness to the Atlantic seaboard and the Gulf ports of the United States, and because a process for converting the ore to commercial oxide had been developed.

THE CUBA DEPOSITS

Iron-rich laterite deposits formed by chemical weathering of serpentine have been known in Cuba since the first voyage of Christopher Columbus in 1492. Nickel was not discovered in these deposits, however, until 1905, when Bethlehem-Cuba Iron Mines Co. began shipping nodulized ore to Bethlehem, Pa., for blast-furnace production of pig iron. The ore was found to contain enough nickel to cause brittle steel. Until the 1930's, nickel was considered an undesirable constituent of the Cuban iron ores.

Between 1935 and 1938, Pardners Mines Corporation became interested in the possibility of exploiting the nickeliferous laterites of Cuba as nickel ore and secured options on large groups of claims in the Levisa and Moa districts. Exploration was begun by pits sunk through the laterite on 800-ft. centres with the objective of indicating enough tonnage with an average grade of 1.45 per cent nickel to justify exploitation. The high nickel content of the underlying altered serpentine was discovered accidentally when the returns were received from samples from a pit that had inadvertently been sunk into this formation.

By 1940 a considerable tonnage of high-grade nickel ore had been indicated in the Levisa district. Freeport Sulphur Co., which was operating a manganese mine at Cristo, purchased the holdings of Pardners Mines in 1940 and formed a subsidiary, Nicaro Nickel Co., which continued development of the deposit. In 1943, the latter company explored the Plateau Cajabanes nickeliferous laterite deposits near Bahía la Muleta. In 1951, it began to develop its Moa claims and by the spring of 1953 enough nickel ore had been opened up to justify a treatment plant.

Other recent investigations are those by Bethlehem-Cuba Iron Mines Co. of its Mayari deposits, which probably have the largest indicated nickel reserves in Cuba, and exploration by the Federal Bureau of Mines in the Levisa district.

The nickeliferous iron deposits (containing one per cent or more nickel) of the Levisa Bay, Moa Bay, Toca Bay and Mayari districts of Oriente Province and the Plateau Cajabanes deposit of Pinar del Río Province are estimated to total about 356,000,000 dry s.tons of ore containing about 4,646,000 tons (1.30 per cent) of nickel, 370,000 s.tons (0.10 per cent) of cobalt, roughly 300,000,000 tons of iron ore (50 per cent basis) and 24,000,000 tons of chromite (48 per cent basis). Reserves of ore containing less than one per

cent nickel are estimated to total 1,653,000,000 tons containing about 13,000,000 tons (0.80 per cent) of nickel and 1,157,000 tons (0.07 per cent) of cobalt. The ores occur at or near the surface with up to a few feet of overburden and can therefore be mined by open pit. The nickeliferous iron ore deposits in the Mayari district have no overburden.

THE NICARO PLANT

Early in 1942 the Nicaro Nickel Co. designed and built for the United States Government a plant at Nicaro to utilize the orebodies in the Levisa district. Operations were begun late in the following year and production was suspended on March 31, 1947. Meanwhile 3,323,075 dry tons of ore had been processed, from which 31,785 s.tons of nickel plus cobalt had been recovered. The nickel-producing facilities were declared surplus and transferred to the War Assets Administration on July 11, 1947. The plant subsequently became a responsibility of the General Services Administration and was held in standby condition, with limited maintenance.

When nickel became scarce as a result of the Korean War G.S.A. undertook the administrative task of bringing the plant into production for national defence. By the end of 1952 four of the twelve furnaces were again in operation.

Ownership of the plant is vested in the Cuban Nickel Co., a wholly owned U.S. Government corporation, which also owns a townsite with the necessary facilities, mining equipment, and 11 miles of railroad. The Government venture is managed by the Nickel Processing Corporation, in which National Lead Co. owns 60 per cent of the stock and Fomento de Minerales Cubanos, S.A., 40 per cent. The basic fee is 1 c. a lb. for nickel-cobalt oxide powder production, plus an incentive of $\frac{1}{4}$ c. a lb. to compensate the contractor for greater research effort. The contractor, however, may claim $1\frac{1}{2}$ c. a lb. for sintered oxide and 2 c. a lb. for metal.

The ore supply comes from the Ocuja-San Juan claims on land owned by the Nicaro Nickel Co., the mines being situated about nine miles from the plant. The royalty on the ore is at the rate of 6.301 c. per lb. of the nickel-cobalt content of the oxide obtained. A contract between Cuban Nickel Co. and Nicaro Nickel Co. stipulates that one-third of the ore treated in the Nicaro plant must be from the Nicaro Nickel Co. holdings.

Early in 1952 consideration was given to the enlargement of the Nicaro plant, but at that time the known ore reserves were insufficient to justify the projected expansion. For this reason the Defence Materials Procurement Agency, in May, 1952, entered into an agreement with the Bureau of Mines to explore the Cuban Nickel Co. claims and other claims to be acquired, and to estimate the cost of producing the ore found. This work was performed and the agreement was terminated on June 30, 1954.

In December, 1953, G.S.A. was authorized to expand the facilities at the Nicaro plant by 75 per cent, thereby increasing the annual ore feed of the plant from 1,461,000 dry s.tons to 2,555,000 tons.

The nickeliferous ores of the Levisa district consist of blanket deposits of high-iron laterite overlain in part by

high-iron but lower nickel laterite. The iron content varies from 35 to 55 per cent and the nickel content averages 0.75 per cent. The ore is underlain by altered serpentine, which grades into unaltered serpentine and has a fairly consistent iron and nickel content of 5 and 0.02 respectively. The overburden varies in depth from 3 to 16 ft., with an average depth of 6 ft. It totals 8,300,000 dry tonnes and with improved metallurgy is potential ore.

In 1940, sampling and experimental work were begun by the Nicaro Nickel Co. in the vicinity of Levisa Bay. Deposits were outlined that contained about 31,000,000 tons of lateritic and serpentine ore having a nickel content of 1.45 per cent. During 1943-47 and 1952-53, about 5,604,000 tons were mined. Meanwhile much additional ore had been added to the reserves. On January 1, 1954, the total reserves of the Nicaro Nickel Co. in this area were about 67,000,000 s.tons, averaging 1.40 per cent nickel and 0.10 per cent cobalt.

This company also has extensive holdings in the Moa Bay area on the north coast of Oriente Province, 500 miles east of Havana and 40 miles east of the town of Nicaro. Drilling on 328 ft. centres has developed 40,000,000 dry tons of ore, averaging 1.35 per cent nickel, 0.14 per cent cobalt, and 46.5 per cent iron. The average thickness of the ore is about 25 ft., with a maximum thickness of 80 ft. developed in limited areas. The Moa Bay ore contains more nickel and less iron than the Mayari ore.

OTHER OPERATORS

Exploration by the Bureau of Mines on claims owned by the Cuban Nickel Co. in the Levisa district has indicated 31,560,458 dry tonnes of ore containing 35.8 per cent iron, 1.39 per cent nickel, and 0.10 per cent cobalt, as well as a further 7,456,143 tons of potential ore.

The individual ore tracts are widely scattered. They lie in two natural divisions, namely the Ramona-Loma Mulo area and the Levisa area. The ores of the first division could be mined in conjunction with the Ocujal-San Juan operation and could be shipped to the plant by the existing railway. A separate railway would be required for ores of the Levisa River area.

The Ramona-Loma Mulo area, which adjoins the Nicaro Nickel Co.'s Ocujal-San Juan group of claims, has been selected for the first production from Cuban Nickel Co. ground. Apart from the geographical advantages, the grade of indicated ore is above average, being 1.45 per cent nickel as compared with the average of 1.39 per cent nickel for the total Cuban Nickel Co. reserves. The ore treated in the processing plant in 1953 averaged 1.37 per cent nickel. Development drilling of the indicated reserves was begun in April, 1954.

The 10 claims in the Ramona-Loma Mulo area would supply two-thirds of the ore for the Nicaro plant for about 10 years. Following this, the Cuban Nickel Co.'s indicated reserves in the Levisa area would last another 10 years. When all Cuban Nickel Co. ore is depleted, present measured and indicated reserves of Nicaro Nickel Co. ore in the Levisa district are adequate for another seven years, with estimated inferred reserves for another 14 years.

DEVELOPMENT AND MINING

The present methods used by the Nickel Processing Corporation in development follow those established by Nicaro Nickel Co. during the first operation. They consist of drilling 6-in. holes on a 100 ft. x 100 ft. pattern, followed by 4-in. hand auger holes on a 50 ft. x 50 ft. pattern to establish the depth of overburden to be stripped. Sampling is done to establish cutoffs between overburden and ore of 1 per cent nickel.

Development of the entire area on a 100 ft. x 100 ft. pattern would require an additional 3,500 development holes and 4,500 mining purposes holes, bringing the total number of holes for development and mining to 8,000 and the total depth to 73,982 ft.

Clearing timber and removing topsoil will be required before mining, the estimated area to be cleared being 988 acres. The entire area was covered with pine and hardwood forests until 1945, when fires burned large areas of the pine forests.

Three methods are proposed for stripping the overburden according to depths: from 2 to 4 ft. by caterpillar tractors, 4 to 8 ft. by self-loading wheel scraper, and 8 to 22 ft. by power shovel into trucks or by dragline excavators direct into worked out pits. All the overburden should be placed for possible future recovery and treatment, since most of it has a high iron content.

The mining plan presented is for the Ramona and the Loma Mulo mines to be operated concurrently and in conjunction with the Ocujal mine. The actual mining of the ore at both places would be routine and patterned after the established practice at the Ocujal mine. Because of the rough country, however, a number of problems are presented in getting the ore from the mines to the existing railway at Ocujal. Another problem would be the necessity of handling the Cuban Nickel ore separately from that mined on Nicaro Nickel holdings. It is proposed to establish stockpiles at strategic points to which the ore can be trucked as mined.

The daily requirements of ore from the Ramona and Loma Mulo areas for the expanded plant are estimated at 3,700 and 1,900 dry tonnes respectively. The daily tonnage can be obtained from the Ramona by dragline with a 5 cu. yd. bucket and one 2½ cu. yd. dipper shovel. In the Loma Mulo area one shovel would be sufficient to supply the daily requirements. It is proposed that there should be one spare shovel as a standby at each area. The average total cost of excavation with this equipment would be \$0.087 per s.ton.

ORE TRANSPORTATION

The ore as mined would be loaded into end-dump trucks having a capacity of 15 cu. yd. and hauled to central stockpiles, four of which are proposed. The average length of haul from each claim varies from 1.15 miles to 4 miles, with an overall average haul of 1.89 miles and average costs of 11.88 c. per ton-mile and 22.50 c. per tonne.

Transportation of the ore from the ore tracts to the terminal of the present railway at Ocujal is the principal problem involved in exploiting the Cuban Nickel ore in this area. The mined ore as loaded into trucks could be hauled directly to the railway or to transfer points. Alternative methods which have been considered for transporting the ore from stockpiles to Ocujal include bicable aerial tramways, belt conveyors, and railway haulage. Tentative estimates of operating costs per ton are \$0.546 for truck haulage, \$0.350 per ton for aerial tramways, and \$0.376 per ton for belt conveyors.

Manufacturers assert that the sticky Cuban ore could be transported satisfactorily and economically by belt conveyors. High-pressure sprays would have to be installed to wash the belts after the ore was discharged at the end of each flight. Belt conveyors totalling 4.4 miles would be required, the estimated cost being \$1,700,000.

The extension of the present railway to the Ramona claim has been proposed as an alternative proposal, but ores from the Loma Mulo area would still require transportation by either aerial tramways or belt conveyors. Construction costs, inclusive of 50 per cent of the additional rolling stock required under the expansion programme, are estimated at \$3,214,000.

The Iron and Steel Industry in Latin America

At its Fourth Session, held in Mexico, the Economic Commission for Latin America adopted a resolution calling for studies on industries in Latin America. This led to a meeting of a Working Group on the iron and steel industry in Latin America, which took place in Bogota from October 12 to November 2, 1952, under the co-sponsorship of the Commission and the United Nations Technical Assistance Administration. The report of the meeting comprises two volumes, the first of which contains the findings of the meeting and the secretariat studies. Volume II will contain the working papers presented by the experts. The whole is summed up in the following article.

The work undertaken by the Economic Commission was directed towards four main objectives. First, the analysis of the evolution of consumption and supply of iron and steel products; second, a study of the hypothetical costs of steel products; third, approximate estimates of the investment required to establish integrated steel plants appropriate to the size of the respective markets; and fourth, the technical problems hindering the development of the steel industry in the region. Analysis was restricted to seven countries, namely Argentina, Brazil, Chile, Columbia, Mexico, Peru and Venezuela, in each of which there is either an integrated steel industry or good prospects of its establishment.

During most of the past 25 years, almost all seven countries were unable to obtain the steel which they required. Instead, they secured only such amounts as their capacity to import would permit them to buy on the world market, supplemented, in some cases, by domestic steel products.

The size of the plant was found to have the most important bearing on costs. In general, the consumption rates of even those Latin-American countries which use most steel are still too small to justify the installation of modern specialized plants.

PRODUCTION COSTS

A detailed analysis of the influence of the most important factors affecting production costs was prepared by comparing the costs of hypothetical steelworks with those of plants of the same capacity located at Sparrows point on the eastern coast of the United States. The results of the comparisons were generally favourable for Latin America. In all cases analysed—even for those which would result in high costs—domestic output of steel in Latin America would mean a substantial saving of foreign exchange.

Steel production requires substantial investment. In the initial stages four or five units of investment are required to obtain one unit of production.

Problems are presented by the scarcity of known coal reserves in Latin-American countries, with perhaps the sole exception of Columbia. Few of the proved deposits contain good coking coals, while several good coals are difficult to wash because the ashes they contain are too finely disseminated. Little knowledge is available of Latin-American raw materials which can be used for blending to improve the coking property of coals, or as substitutes for coke. Some of the coals, blending materials, or substitutes for coal known in Latin America have such a high sulphur content that they have been discarded altogether or have raised operating costs considerably. Finally, the distances for coal transport to steelworks—including imported coal—are generally excessive and lead to high pig iron costs.

Latin America as a whole is rich in high-grade iron ore, and is at present a substantial exporter. Nevertheless several problems arising from the quality or availability of iron ores are noted by the Commission. In several countries the phosphorus content of local materials is too high for the basic open-hearth process and too low for the basic converted process (Thomas). Unusual percentages of certain impurities appear in the case of two countries, namely arsenic in Mexico and titanium in Chile. These problems

are complicated by the fact that Latin-American integrated plants can be supplied with only a very restricted range of different iron ores, thus eliminating the solution of blending various ores, and obliging greater caution to be exercised in studying the design and operation of steel works.

The production of one ton of steel requires four to six tons of raw materials, depending on the grade of the minerals and coal. Transport of raw materials therefore represents an important share of aggregate production costs and, together with the transport of end products to the market, determines the best economic site for the plant.

NATIONAL PROBLEMS

In Latin America a particular technical problem is that of finding iron and steelmaking processes which allow improvements in productivity for small-scale operations. Such processes could be applied to specific sites in the countries included in the survey.

Argentina's iron and steel plan envisages, as a first step, the annual production of from 700,000 to 750,000 tons. There have been many discussions as to whether the installation of an integrated steel industry in Argentina is justified. The adverse opinions have been based mainly on the assumption that a country devoid of coking coals would produce expensive steels. Calculations by the Commission show that a plant with a capacity of 850,000 tons at San Nicolás would have almost identical delivered costs for finished steel and for imported steel.

Brazil has the largest steel industry in Latin America. Projects are under way to expand production to 1,500,000 tons or even more by 1955. A second blast furnace now being installed at Brazil's largest plant, the Volta Redonda, is expected to provide an aggregate annual capacity of a 1,000,000 tons of steel ingots. The largest coking coal formation known in Brazil is at Barro Branco.

Chile's main fuel problem is the need to import low volatile coals to improve the coking properties of domestic fuel. Columbia, on the other hand, has no fuel problems, but possesses the largest known coal reserves in the region.

Mexico is rich in iron ore deposits and has coal formations, many of which are coking coals or coals suitable for coking. Consideration has been given by the Commission to the possibility of overcoming transport difficulties and the overloading of the railway system through the creation of new steel works in other zones.

In Peru there is a project for a 53,000 ton steel plant to be installed at Chimbote, using electric reduction furnaces. On the other hand, the possibility of producing good metallurgical coke with Santa Valley anthracite is at present being investigated.

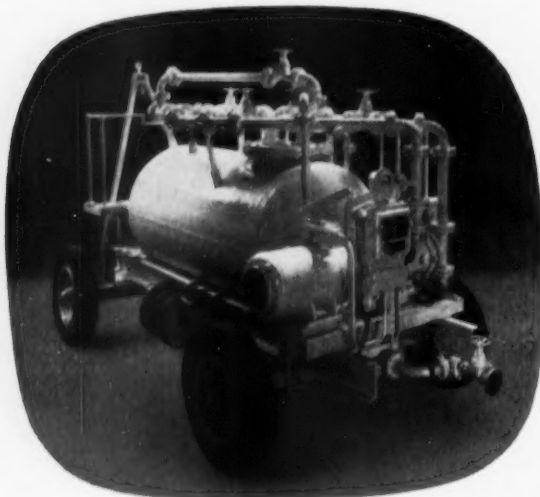
Venezuela's natural resources include very large reserves of the highest grade ore, mainly haematites, which are situated to the south and east of the Orinoco close to its junction with the Caroni river. Two deposits have been granted as concessions to large steel companies from the United States. Ports, mining facilities, ships, and eventually the dredging of the Orinoco are being organized. Some coal deposits on the Atlantic Coast are now being exploited on a small scale.

MACHINERY AND EQUIPMENT

A Mobile Acidizing Plant

A mobile acidizing plant recently has been designed and manufactured by the K.S.B. Manufacturing Co. Ltd., to the instructions of an oil company for shipment to an Australian refinery.

The plant, which is rubber-lined throughout, is designed for pumping hydrochloric acid at all concentrations for the descaling of heat exchangers. Due to the valve arrangement it is possible for the pump to fill the tank with water, then the required amount of acid, then mix the acid and water by circulation through the unit alone. Once the acid and water



The K.S.B. mobile acidizing plant

are mixed the liquid is pumped through a flexible delivery hose into the heat exchanger, returning via a similar hose to the unit. The direction of flow can also be reversed without stopping the pump.

The plant in the main comprises a welded steel, rubber-lined tank 8 ft. long by 4 ft. diameter (capacity approximately 800 U.S. gallons), a rubber-lined centrifugal pump having a capacity of 225 U.S. gallons per min. against a total head of 120 ft., a 15 h.p. flameproof squirrel cage motor and a flameproof star delta starter. These items, including the interconnecting rubber-lined pipework and valves are fitted on a fabricated steel chassis mounted on two axles to form a complete mobile unit.

One side of the unit is fitted with an 18 in. wide steel catwalk to provide easy access to the valves and hose couplings, whilst the other side carries a cable drum for the motor cable. The overall size of the unit is approximately 13 ft. long, 7 ft. 6 in. wide and 8 ft. 9 in. high.

Steel Ropes for Deep Mine Shaft

A single load of 48 tons of steel rope recently left the Doncaster factory of British Ropes Ltd., en route for the Gold Coast of West Africa. The rope is part of an order from the Ashanti Goldfields Corporation, amounting to 268 tons of rope with a total length of nearly 14½ miles, and a value of £38,942.

This order is noteworthy because the ropes are to be used in the deepest mine shaft in the Gold Coast Colony, namely the Eaton-Turner Shaft at Ashanti Mine. The shaft, now nearing completion, is designed to hoist from a depth of 4,200 feet, and will be the only one in this region where locked coil winding, guide and rubbing ropes are used.

Of a total of 16 ropes supplied, three are winding ropes and 13 are guide and rubbing ropes. Two ropes (one winding rope and one guide or rubbing rope) are encased in zinc sheeting. These latter ropes are to be held as spares.

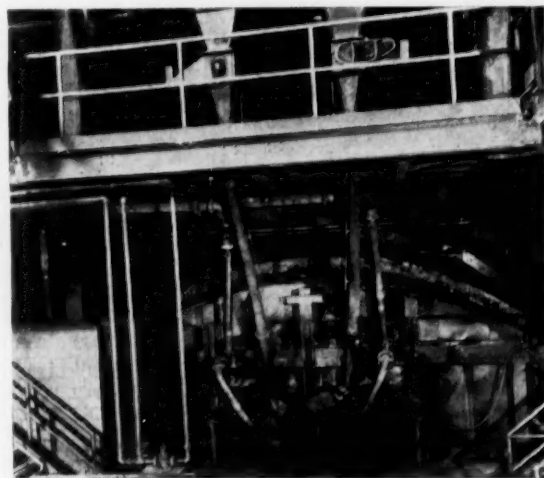
Technical details are that the three winding ropes have a diameter of 1½ in. and a breaking load of 195 tons. The 13 guide and rubbing ropes have a diameter of 1¼ in. and a breaking load of 120 tons.

Inco's New Furnace for Oxygen Flash Smelting

The International Nickel Company of Canada Ltd. has revealed details of its oxygen flash smelting process for treating copper concentrates. One of the world's first commercially successful processes for smelting fine sulphides in suspension, the method is now being used to treat all Inco's copper sulphide concentrates. In 1954 the company delivered more than 250,000,000 lb. of refined copper. Inco's new flash smelting furnace is 68 ft. long, 24 ft. wide and 17 ft. high at the ends, outside its steel casing. It has a smelting capacity of approximately 1,000 tons of dry solid charge daily.

Development of the new process involved the co-operative efforts of the International Nickel Co., Canadian Industries (1954) Ltd. and the Canadian Liquid Air Co. Ltd. The process eliminates the fuel normally required for smelting and permits large-scale output by Canadian Industries (1954) Ltd. of liquid sulphur dioxide produced from the flash smelting furnace gases. The low-cost oxygen which makes Inco's process economically possible is produced by a tonnage oxygen unit known as an Oxyton, which was built for Inco by Canadian Liquid Air Co. This unit produces 325 tons of 95 per cent pure oxygen every 24 hours, corresponding to 2½ billion cu. ft. of oxygen per year, or three times the production of all the cylinder oxygen plants in Canada.

The conventional treatment of copper sulphide concentrate involves smelting in reverberatory furnaces with pulverized coal or other fuel, with or without prior roasting. In the Inco flash smelting process, finely divided copper concentrates and flux are dried and injected with oxygen into the pre-heated smelting furnace to produce matte, slag and a gas containing about 75 per cent sulphur dioxide. In the furnace, the oxygen combines with some of the sulphur and iron of the chalcopryite (copper-



The south end of the 1,000 ton flash surface

iron-sulphide) to form sulphur dioxide and iron oxide. The heat of the reaction is sufficient to melt the residual copper-iron sulphide to form a matte, and the iron oxide combines with the siliceous flux to form a slag. An important feature of the Inco process is a novel method of cleaning the copper-rich slag by flash smelting pyrrhotite at the skimming end of the furnace. The slag is showered with iron sulphide droplets which, in settling into the matte beneath, extract copper from the slag.

The flash smelting furnace gas is water-scrubbed and treated by a wet Cottrell before it is converted into liquid sulphur dioxide by Canadian Industries (1954) Ltd.

METALS, MINERALS AND ALLOYS

COPPER.—Roan Antelope and Mufulira are to offer copper in the United Kingdom at fixed prices; British Insulated Callender's Cables (which recently invested heavily in the Ndola refinery), Enfield Rolling Mills and I.C.I. have accepted the offer and with it the condition of instilling a degree of stability into resale prices for copper and brass products. Prices (yet to be announced) are to be fixed for 30 days, they are subject to change at 24 hours' notice and will then be fixed for a further definite period. The reasons given for the move (which is welcomed by the British Non-Ferrous Metals Federation) are: the instability of L.M.E. quotations over the past seven months; the persistence of a backwardation which makes hedging impossible; the denial of access by certain European countries to the L.M.E. by reason of currency regulations; the thinness of L.M.E. stocks compared with the tonnages priced by the L.M.E., and the unsuitability of pricing R.S.T.'s blister production on L.M.E. contract. U.K. copper prices have already moved a long way from this peak and, barring further dislocations, may be expected to continue the decline especially as Bank Rate makes stock financing expensive. R.S.T.'s scheme has certainly come at an interesting juncture. See also under "Notes and Comments".

Meanwhile, on the other side of the Atlantic there was considerable interest in the new copper pricing proposals and in the decline in cash and three month quotations on the L.M.E. American producers have made no secret of their dislike of the 36 c. price level and look forward to the time when they can safely drop it. With wage negotiations looming up it would clearly suit their purpose to drop it pretty quickly before the allegation that they had done well out of 36 c. could be made to stick. Simon Strauss, Vice-President of American Smelting and Refining, said recently, "we think the 36 c. price is definitely too high and if maintained for any length of time will do damage to the copper industry". J. Y. Murdock, of the Canadian Noranda Mines, said, "the major producers of copper recognize that current prices are excessive . . . temporary high prices brings out little extra metal". Although supply is still tight in the United States at 36 c. this crop of protestations suggest an early fall especially if London were to give a lead and consumers are increasingly less willing to pay premiums over 36 c. for forward delivery.

In the United States, too, offerings of scrap copper have become heavy in the past week as a consequence of cumulative restrictions on exports and No. 2 copper wire scrap fell in consequence by 1 c. to 32 c. per lb.

The Bill continuing duty free import of copper for another three years (when copper falls below 24 c. per lb.) has been approved by the House Ways and Means Committee; present suspension expires on June 30; the Committee has also approved the Bill permitting till June 30, 1956, duty-free import of scrap other than lead and zinc scrap. Mr. Cox, President of Kennecott Copper, has forecast that American producers will be working to capacity throughout 1955 because, although demand would decline, stocks had to be built up.

From Chile it is reported that the Ministry of Mines will shortly approve Anaconda's expansion plans for Potrerillos and Chuquicamata Mines. Braden's plan for a \$2,000,000 investment in El Teniente has already been approved. It is also reported that the long-standing copper legislation is about to be enacted finally; it is by no means clear what powers will be given to the new copper department to be established under the Act.

Confused reports emanate from Rhodesia concerning the recent meetings between the Northern Rhodesian European Mineworkers' Union and the South African Mineworkers' Union. The General Secretary of this latter union has announced a first gift of £5,000 to help in the struggle in Northern Rhodesia to "maintain European standard". This statement has been resented in Government circles in Rhodesia as implying unwanted interference, but the Northern Rhodesian European Mineworkers' Union has since stated that the South African union would only give help if it were specifically asked.

LEAD AND ZINC.—Lead has been bought at a good rate in the past week in New York at 15 c. per lb. although demand has been slightly down on recent weeks. Lead stocks fell again in March from 64,938 tons to 59,881 tons; production ran at 50,380 tons and domestic commercial deliveries at 42,381 tons.

Demand for prime western zinc at 12 c. per lb. East St. Louis was much stronger last week following a falling off on the price rise. With the present construction boom still showing no sign of letting up, demand from galvanizers is strong. Consumer de-

mand for special high grade zinc continues unabated and in excess of supply.

Mr. Simon Strauss, vice-president American Smelting and Refining, in a speech to the American Zinc Institute and Lead Industries Association, emphasized the contrast in 1954 in the United States compared with the rest of the world. Although mine production in the United States was the lowest since before world war II, and consumption of lead and zinc was lower than in 1953, world consumption of both lead and zinc reached new records last year with production also at record rates exceeding consumption. He compared progress with the United States and the rest of the world in the six year period 1950-56 with estimates for 1954 and 1955. World zinc mine production is expected to show an increase of 28 per cent while the world lead-mine production is expected to increase 16 per cent; this change primarily reflects that fact that recent ore discoveries have had higher zinc than lead contents. Mine production in the United States has fallen during this period and the overall increase is due to a rise in lead production in the rest of the world by 27 per cent and of zinc production of 46 per cent. Unless the relationship of domestic and foreign prices changes materially Mr. Strauss believes that imports of lead into the United States are likely to be lower in 1955 than in 1954. Combined imports of lead in ores and concentrates plus refined metal are estimated at between 350,000 and 400,000 tons this year as against 438,000 tons in 1954 and 537,000 tons in 1953. This view is based partially on the belief that non-American stocks have been largely liquidated and therefore could not produce a sudden flood of imports.

Smelter production of zinc does not vary so closely with mine production because of large stocks of concentrates held by both mines and smelters. Currently smelters output is running well in excess of mine supply and the concentrate reserves are being reduced; as they are still quite large however, there is no threat of a shortage of concentrates. The extensive expansion of zinc smelter capacity during the last six years is about completed. Consumption of zinc in the United States over the five years 1950-54 was relatively stable but in 1955 demand is likely to increase to a rate of about eight per cent above 1950, the previous peak. Consumption of zinc outside the United States has been steadily increasing and the 1955 consumption estimate is about 35 per cent above the 1950 rate. Imports of zinc into the United States in 1955 are expected to be the same as in 1954 with three-quarters of the imports in the form of concentrates. It is this heavy import of concentrates that makes possible a 15 per cent increase in American zinc metal production in a period when the annual rate of mine production is expected to drop by 50 per cent.

Finally, Mr. Strauss referred to stockpiling. At present, he said, production and consumption of both lead and zinc appear to be in approximate balance. If stockpiling were to stop producers should not be faced with the problem of rapidly mounting stocks—such as occurred in 1952 and 1953. With regard to future stockpiling he believed that since the 300,000 tons of zinc and 200,000 tons of lead in the present programme were required to meet stockpile targets they would presumably be bought, and would provide some protection against any sudden change in business activity. He emphasized, however, that the present balance had been achieved on the basis of the price levels of the past nine months and any material increase in prices particularly of zinc, would stimulate mine production and discourage certain classes of consumption. Imbalance might then recur. The speech, and especially the latter part, appears to be remarkable sound and in sharp contrast to some of the cruder protectionist arguments heard in Washington in recent weeks.

TIN.—Tin drifted slightly lower in New York in an otherwise featureless market while the trade waited for Washington to make up its mind finally on the Texas smelter. The position is that a resolution is now before the House, similar to that passed by the Senate, calling on the administration to keep the smelter going for another year while plans are made for its sale or continued operation. It is considered extremely unlikely that the resolution will not be passed and representative Gamble's resolution calling for an end of the smelter is not expected to get far. Everything depends, after that, on the President. It would be a pity if a final decision on the smelter were not to be taken this year (as unfortunately seems to be the case) as next year will be a presidential election year and reason is even less likely to prevail.

Meanwhile, until definite news is heard of the smelter's future, no developments are to be looked for from the I.T.A. Mr. Depage, president of the committee of Belgian Congo and

Ruanda-Urundi tin producers has, however, recently called the early ratification of the I.T.A. "essential for a stabilized tin market." Msr. Depage clearly takes a moderately optimistic view of I.T.A.'s chances for he classes Indonesia—the key to the whole problem—among the countries in which ratification procedure is in train. Technically this is so, but there is no certainty that the process will ever be completed. On the future of the industry as a whole he is also optimistic. With world consumption disturbed by the Korean war and American government restrictions in tin uses it is difficult to discern basic trends, but Msr. Depage detected in 1954 for the first time obvious signs of a natural tendency for consumption to increase. Furthermore, tin consumed in tinplate (40 per cent of all tin consumption) has been steadily rising and at 61,000 tons in 1954 was approaching the peak year of 70,000 tons of 1937. He believes that from 1955 tinplate production will be high enough to require 70,000 tons of tin thus overcoming for the first time the commercial consequences of electrolytic tinning. Msr. Depage is also able to show—in spite of some violent price fluctuations—how hollow is the charge of gouging. The average New York price in 1954 he says was the lowest since 1947 and showed remarkable stability. Further, although the price of New York tin rose 4.45 per cent in 1954 increases for copper, lead and zinc were 17.7 per cent, 15 per cent and 11 per cent respectively. Finally, comparing average 1954 prices with the average prices of 1925-44 he shows the price of tin rose very much less than those of copper and lead and only very slightly more than that of zinc.

ALUMINIUM.—The Businesses and Defence Services Administration announced at the beginning of this week that 113,000,000 lb. of aluminium would be allocated to fill U.S. Defence Department and Atomic Energy Commission orders from the total available production in the third quarter of this year. This was 2,000,000 lb. less than the amount set aside to fill similar orders in the second quarter of this year and the announcement stated that the lowered allocation reflected a change in military requirements.

U.S. production of primary aluminium in both March and in the first quarter of this year established new records. March output rose to 260,543,479 lb., a record for any month, and compared with 232,472,999 lb. in February and with 244,678,349 lb. in March, 1954. The March figure brought the total production of primary aluminium in the first quarter of 1955 to 749,423,226 lb. compared with 698,137,342 lb. in the corresponding quarter of 1954.

The Reynolds Metal Company is to build a \$3,000,000 aluminium extrusion plant on its Bellwood property, south of Richmond, Virginia. Construction will begin shortly, and the mill which is designed to turn out 12,000,000 lb. annually of aluminium extrusions, is expected to be operating by the beginning of 1956.

GOLD.—The Agent General for Western Australia has advised that during March 111,675 oz. of gold were received at the Royal Mint, Perth, valued at £1,395,942.

The March native labour figures issued by the Transvaal and Orange Free State Chamber of Mines showed that natives employed in gold mines had reached the high level of 330,002.

LITHIUM.—As from Thursday of last week a control has been imposed on the export of lithium from the U.S. to all countries other than Canada. Export is now only to be permitted under individual licence. In making this announcement the Department of Commerce states that this measure has been taken "to protect the national security," which if it means anything, should probably be taken as an indication of the rapidity with which the use of this metal is growing in the field of atomic energy both military and civil.

TITANIUM.—The output of titanium mill products in the first quarter of 1955 totalled 797,000 lb., representing an increase of 28,653 lb. over the 1954 fourth quarter total. The Miscellaneous Metals and Minerals Division of the Business Defence Services Administration in announcing these figures said that of the total produced in the first quarter, sheet, plate and strip accounted for 460,364 lb.; forgings and extrusion billets for 221,124 lb.; and rod, bar and wire accounted for 115,731 lb.

The London Metal Market

(From Our Metal Exchange Correspondent)

The main item of news has been the announcement by the Rhodesian Selection Trust Group of a plan to sell their copper on a pricing basis divorced from the Metal Exchange quotations. The decline in the price on Monday was due more

to the lack of demand from the Continent than to the effect of the announcement, as it was generally realized that the copper involved in the R.S.T. plan did not normally affect the market. The most important bearing the plan has upon the Exchange is a possible loss of prestige, and the next few months will show whether a fixed quotation for a given period enables buyers to obtain cheaper copper than would be the case if they used their skill and ingenuity and based their purchases on the fluctuating quotations of the L.M.E. Whatever happens, this is a worth while attempt to bring more stability into the copper price, which is the wish not only of producers but also of members of the market if it does not detract from the status of the Exchange.

Interest this week in Tin has been patchy, and with no further indications of when the new Agreement is likely to be ratified by the Dutch, Indonesians and French, markets are likely to remain stagnant for the next few weeks. On Thursday morning the Eastern price was equivalent to £728½ per ton c.i.f. Europe.

The lead and zinc markets have had a good undertone, and expectations that the American domestic quotation for zinc will be raised have not yet entirely disappeared. Demand in the U.S. remains extremely good, but that in the U.K. is tending to show some signs of slackening off, possibly owing to the psychological effects of the coming election.

	April 28		May 5	
	Buyers	Sellers	Buyers	Sellers
Copper				
Cash	£313½	£314	£305½	£306½
Three months	£301	£302	£291½	£292
Settlement	£314		£306½	
Week's turnover	5,950 tons		6,950 tons	
Tin				
Cash	£715	£715½	£710½	£711
Three months	£715	£716	£714	£714½
Settlement	£715½		£711	
Week's turnover	1,100 tons		680 tons	
Lead				
Current half month	£103½	£103½	£103	£103½
Three months	£103½	£103½	£103	£103½
Week's turnover	3,500 tons		4,150 tons	
Zinc				
Current half month	£88	£88½	£88½	£88½
Three months	£87	£87½	£87½	£87½
Week's turnover	3,925 tons		4,000 tons	

OTHER LONDON PRICES — MAY 5

METALS

Aluminium, 99.5%, £163 per ton	Magnesium, 2s. 4d. lb.
Antimony—	Nickel, 99.5% (home trade
English (99%) delivered, 10	£519 per ton
cwt. and over £210 per ton	Osmium, £30 oz. nom.
Crude (70%) £200 per ton	Osmiridium, £40 oz. nom.
Ore (60% basis) 22s./24s. nom.	Palladium, £6 5s./£6 15s. oz.
per unit, c.i.f.	Platinum, £27/£27 15s.
Bismuth	Rhodium, £41
(min. 2 cwt. lots) 16s. lb.	Ruthenium, £16 oz.
Cadmium (Empire) nominal	Quicksilver, £108
Chromium, 6s. 5d./7s. lb.	ex-warehouse
Cobalt, 21s. lb.	Selenium, 43s. nom.
Gold, 250s. 5d.	per lb.
Iridium, £30/£32 oz. nom.	Silver, 75½d. f.o.z. spot and
Manganese Metal (96%-98%)	75½d. f'd
£255/£265 according to	Tellurium, 15s./16s. lb.
quantity	

ORES, ALLOYS, ETC.

Bismuth	50% 7s. 3d. lb. c.i.f.
	40% 6s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semi-	
friable) 48% ..	£13 per ton c.i.f.
" Refractory 45% ..	£13 per ton c.i.f.
" Smalls 42% ..	£10 2s. 6d. per ton c.i.f.
Magnesite, ground calcined ..	£26-£27 d/d
Magnesite, Raw ..	£10-£11 d/d
Molybdenite (85% basis) ..	105s. 3d.-108s. 1d. per unit c.i.f.
Wolfram and Scheelite (65%) ..	255s./260s. c.i.f.
Tungsten Metal Powder ..	20s. 0d. nom. per lb. (home)
(98% Min. W.)	
Ferro-tungsten (80%-85%) ..	17s. 0d. nom. per lb. (home)
Carbide, 4-cwt. lots ..	£37 6s. 3d. d/d per ton
Ferro-manganese, home ..	£53 17s. 6d. per ton
Manganese Ore Indian c.i.f.	
Europe (46%-48%) ..	76d./78d. per unit
Manganese Ore (38%-40%) ..	64d./66d. per unit
Brass Wire ..	3s. 0d. per lb. basis
Brass Tubes, solid drawn ..	2s. 4½d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

Last week, markets were still overshadowed by the coming general election and business remained at a comparatively low level. There was a rise of \$19,000,000 in the gold and dollar reserves for April; this is the first improvement for some time and was taken for an encouraging sign.

The encouraging returns given by the leading finance houses brought about sharp rises in many Kaffir shares. The chief beneficiaries were Anglo American Corporation, Johannesburg Consolidated and West Witwatersrand. This last benefited from optimistic press comments concerning possible future developments.

Among individual Rand mines, Far West Rand shares were further assisted by the returns from Doornfontein and West Driefontein. Some of the older properties, however, were weak. Doubts concerning the maintenance of the present dividend levels by City Deep, Simmer and Jack, and Robinson Deep kept these share prices unchanged. Rose Deep also failed to follow the general market trend due to the lower profits. Hartbeestfontein maintained their 98 per cent payability on underground developments and the shares rose sharply. There was more interest in certain of the uranium producers, notably Western Reefs and Randfontein. Dominion Reefs, however, failed to maintain last week's improvement.

Orange Free State shares stole most of the thunder. Encouraging reports were forthcoming from many of the leading companies and an all round improvement occurred in share prices. Free State Geduld rose on hopes that the Southern area of the property will prove exceptionally rich. Loraine went ahead following the announcement that uranium values at the mine are likely to prove payable. The exceptional result of over 3,000 in. dwt. from President Brand caused a big jump in the share price; the mine hopes to be able to finance further necessary developments out of profits. Both President Steyn and St. Helena which are adjacent to the President Brand mine went ahead sharply following the news. The former property will have to issue fresh capital to finance further shaft sinking, but St. Helena, which continued its steady and improving record, should be able to find all funds from current earnings. Welkom and Western Holdings were also excellent features. The cost of

the two new ventilation shafts on the Welkom property will be shared by the two President mines. Western Holdings hopes to finance expansion also out of earnings, and at the same time to pay moderate dividends while this is being done.

West Africans were more active. Buyers appeared for Ashanti following the chairman's optimistic speech and reports concerning the drive to cut operating costs. Konongo proposed to repay 1s. per share capital as this is unlikely to be required. Western Selection continued the steady improvement of the past few weeks.

Diamond shares benefited from some of the reflected glory of the Kaffir market, but apart from De Beers which has a substantial interest in the Orange Free State, gains were on a modest scale.

In the copper market an event of outstanding interest took place. The chairman of Rhodesian Selection Trust announced a plan for fixing copper prices for consumers for 30 day periods. The idea behind this is to stabilize the price to enable fixed quotations to be made for certain manufactured goods. The Anglo American group, as far as it is known, does not intend to participate in this scheme, preferring to rely upon the London Metal Exchange quotations. The resulting easier trend in the metal price caused some falls in the share markets, notably by Chartered.

Tin shares, in both the Eastern and Nigerian groups, showed little change and price movements were erratic. Beralts continued very firm, due to the rise in the price of tungsten.

In the lead/zinc market, there was rather more activity, but here again price movements were unpredictable and sharp gains by Mount Isa and Uruwira were offset by falls in Broken Hill South and North Broken Hill.

Among miscellaneous base metals there was little of significance to report, prices gaining or losing the turn without any general trend. The improved figures from Consolidated Murchison failed to affect the price of the shares.

Canadian mines benefited from the improvement on Wall Street. Base metal properties were very much to the fore but International Nickel failed to respond to the 5 cents increase in the quarterly distribution.

FINANCE	Price May 4	+ or - on week	RAND GOLD contd.	Price May 4	+ or - on week	DIAMONDS & PLATINUM	Price May 4	+ or - on week	TIN (Nigerian and Miscellaneous) contd.	Price May 4	+ or - on week
African (L) European...	3 1/2	+ 1/8	W. Rand Consolidated...	44 1/4	+ 1/10	Anglo American Inv. ...	8 1/2	—	Gold & Base Metal ...	2/6	+ 1 1/2
Anglo American Corp. ...	7 1/2	+ 1/8	Western Reefs ...	43 1/2	+ 1/10	Casta ...	25/-	+ 1/-	Jantar Nigeria ...	8 1/4	+ 3d
Anglo-French ...	21 1/3	+ 7 1/2				Cons. Diam. of S.W.A. ...	7	—	Jos Tin Area ...	13 1/9	—
Anglo Transvaal Consol. ...	27 1/2	—	O.F.S. GOLD			De Beers Defd. Bearer ...	5 1/2	+ 1/8	Kaduna Prospectors ...	2 1/4	—
Central Mining (El shrs.) ...	42 1/9	— 3d	Freddies ...	4/6	+ 6d	Pots Platinum ...	15 1/2	—	Kaduna Syndicate ...	2 1/4	—
Consolidated Goldfields ...	58 1/9	+ 7 1/2	Freddies Consolidated ...	6/3	+ 6d	Waterval ...	14 1/4	+ 3d	London Tin ...	7 1/9	+ 3d
Consol. Mines Selection ...	38 1/4	+ 1/8	F.S. Geduld ...	4 1/2	+ 1/8				United Tin ...	2/9	—
East Rand Consols. ...	2 1/4	+ 1/8	Geoffries ...	18/-	+ 2 1/2						
General Mining ...	5 1/2	+ 1/8	Harmony ...	35 1/9	+ 2 1/2						
H.E. Prop. ...	9 1/4	—	Loraine ...	11 1/3	—	COPPER			SILVER, LEAD, ZINC		
Johnnies ...	37 1/6	+ 2 1/2	Lydenburg Estates ...	21 1/3	+ 2 1/2	Bancroft ...	40 1/10	+ 4 1/2	Broken Hill South ...	52 3/8	— 1/3
Rand Mines ...	3 1/2	+ 1/8	Merriespruit ...	12/-	—	Chartered ...	54 1/9	— 3 1/2	Burma Corporation ...	2/6	—
Rand Selection ...	42 1/6	+ 7 1/2	Middle Wits ...	18 1/6	+ 2 1/2	Esperanza ...	4/6	—	Consol. Zinc ...	45 7/8	+ 1 1/2
Union Corporation ...	40 1/2	+ 1/8	Ofsets ...	3 1/2	+ 1/8	Messina ...	7 1/2	—	Lake George ...	12/-	+ 6d
Vereeniging Estates ...	42 1/6	—	President Brand ...	72 1/6	+ 5 1/2	Nichanga ...	13 1/2	+ 1/8	Mount Isa ...	52/-	+ 1 1/4
Wits ...	38 1/9	+ 2 1/2	President Steyn ...	40 1/6	+ 2 1/2	Rhod. Anglo-American ...	21/-	+ 1 1/4	New Broken Hill ...	33 1/6	— 3d
West Wits ...	38 1/9	+ 2 1/2	St. Helena ...	29 1/6	+ 2 1/2	Rhod. Katanga ...	34/-	—	North Broken Hill ...	71 3/8	— 1/3
			Virginia Ord. ...	14 1/6	+ 1/8	Rhodesian Selection ...	34/-	—	Rhodesian Broken Hill ...	11 1/3	— 1 1/2
			Welkom ...	22 1/3	+ 1 1/2	Rhokana ...	34/-	+ 1/-	San Francisco Mines ...	21/-	— 3d
			Western Holdings ...	4 1/2	+ 1/8	Rio Tinto ...	52/-	+ 1 1/2	Uruwira ...	6 1/2	+ 1 1/2
						Roan Antelope ...	24/-	— 7 1/2			
						Selection Trust ...	68 1/9	+ 1 1/2			
						Tanks ...	6 1/2	+ 1/8	MISCELLANEOUS		
						Thariss Sulphur Br. ...	5 1/2	+ 1/8	BASE METALS & COAL		
									Amal. Collieries of S.A. ...	49 1/4	+ 7 1/2
									Associated Manganese ...	37 1/3	— 9d
									Cape Asbestos ...	12/-	+ 6d
									C.P. Manganese ...	38/-	— 6d
									Consol. Murchison ...	62 1/6	—
									Natal Navigation ...	24/-	+ 1/8
									Turner & Newall ...	104/-	— 1/-
									Wankie ...	18 1/3	— 3d
									Witbank Colliery ...	4	—
									CANADIAN MINES		
									Dome ...	\$30	—
									Hollinger ...	\$40	—
									Hudson Bay Mining ...	\$108	+ 3
									International Nickel ...	\$116	—
									Mining Corp. of Canada ...	\$7 1/2	+ 1/8
									Noranda ...	\$17 1/2	+ 5
									Quebec ...	\$8 1/2	—
									Yukon ...	4 1/3	—
									OIL		
									British Petroleum ...	78 1/9	+ 3/3
									Apex ...	27 1/2	—
									Attock ...	44 1/2	+ 7 1/2
									Burmah ...	5 1/2	+ 1/8
									Canadian Eagle ...	49 1/9	— 9d
									Mexican Eagle ...	20 1/6	—
									Shell ...	6 1/2	— 1/8
									Trinidad Leasehold ...	29 1/9	— 7 1/2
									T.P.D. ...	24/-	—
									Ultramar ...	27 1/10	+ 4 1/2

ANGLO AMERICAN'S PROGRESS IN THE O.F.S.

The recent batch of year end reports and accounts up to December 31, 1954, from the Anglo American Corporation's Orange Free State mines has done much to dispel the gloom which has lately settled over the Kaffir market. Not the least important contributor towards the better tone which has resulted were the reports of improving underground conditions in the new field. This has done much to offset adverse rumours which have lately been in circulation. The statements of Mr. H. F. Oppenheimer will be found on page 508.

Marketwise, it was in some respects fortunate that encouraging news of underground progress should have been released simultaneously with plans for substantial capital expenditure at the new Orange Free State mines. For although the necessity of additional shaft sinking had long been accepted as part and parcel of future O.F.S. development, it is, perhaps, permissible to doubt whether it has been generally anticipated that such expenditure would be undertaken at so early a date. On the other hand, due to the higher cost structure in the O.F.S. than on the old Rand, the sooner mill throughputs can be raised to the highest level of economic productivity, the better. Some might argue, however, that such a course is bound to restrict initial dividend payments which are eagerly awaited. But if the necessity of a large capital programme is accepted, few would dispute the wisdom of introducing it during a time when little or no tax will be payable by the mines concerned.

PRESIDENT BRAND'S 3,371 IN.-DWT. STRIKE

Of the many interesting aspects dealt with in exceptional detail and clarity by Mr. H. F. Oppenheimer, perhaps the first mention is due to President Brand. At this property the outstandingly high value of 3,371 in. dwt. has been obtained from 215 ft.—all of which was payable—on the boundary of St. Helena Gold Mine. This is the highest value level yet obtained

on the property, and considerably enhances the prospects for this part of the mine. The discovery has also, of course, the greatest bearing on the future of St. Helena where work has recently been in progress in the vicinity of the eastern border.

In order to enable Brand's milling capacity to be built up to a monthly rate of 90,000 to 100,000 tons per month during 1958 certain capital work is to be undertaken. Firstly, it is intended to proceed immediately with the sinking of a sub-vertical shaft system at No. 2 shaft to a depth of 7,250 ft. Secondly, in order to provide for extra ventilation it has been decided to join with President Steyn and Welkom Gold Mining companies in sinking—on the latter company's property—a joint shaft system of sufficient size to provide for the ventilation requirements of all three mines. Finance for President Brand's part of the programme, together with its own new shaft, will cost £2,300,000 in addition to which excess development in 1955 will cost £560,000. These sums will be provided from profits, and will not prevent reasonable dividends being paid.

By making available additional ventilation to President Steyn, the Welkom twin vertical shaft system will enable the mill capacity at this property to be increased to 125,000 tons monthly. Moreover, additional air will be provided for the development of the deeper areas east of the No. 1 shaft. The company's proportion of the cost of sinking the new Welkom shafts, together with expenditure on extending the treatment plant, is estimated at £600,000. Other capital expenditure is expected to total about £550,000. It has, therefore, been decided that further funds should be raised by an issue of shares.

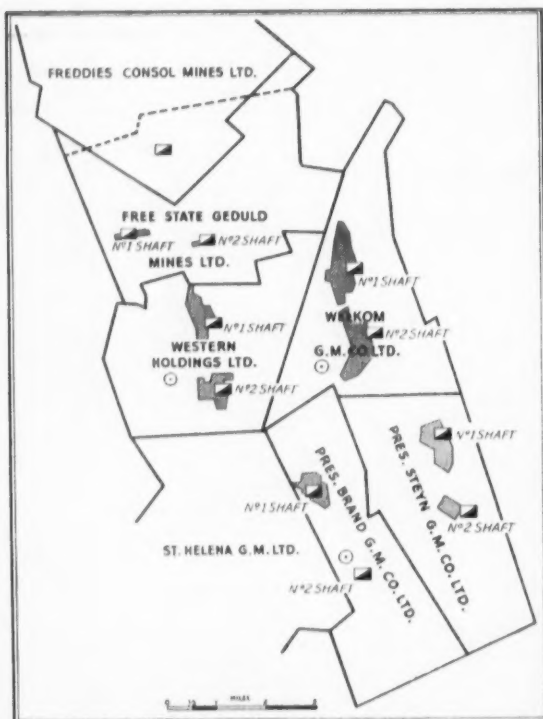
At Welkom, the new shaft system will be used primarily for tapping the rich south-western part of the property which is cut off from the remainder of the mine by the Arrarat fault. Accordingly, extensions to the company's mill will be put in hand to bring the capacity up to 150,000 tons per month. This work, together with its proportion of shaft sinking expenditure and preparatory underground development, will cost about £2,600,000. In order to finance these operations the Anglo American Corporation has arranged to provide the company with fresh loan facilities and to cancel existing indebtedness by a subscription for Welkom shares. Options have also been taken for a further share subscription at a later date.

REVISION OF F.S. GEDULD'S LEASE FORMULA

Last year's work at Free State Geduld Mines has placed the company in a position to advance into areas that are believed to be drier and less broken than those reached so far. Present indications are that the reef lying to the south of No. 2 shaft will prove to be a particular case in point and consequently it is intended to push forward rapidly into this area and to join up with the haulage on 41 level which has been driven northwards from Western Holdings. If operations go according to schedule, it should be possible during the coming months to make several raise connections with the Western Holdings haulage. A number of stoping areas in the exceptionally promising part of the mine south of No. 2 shaft would then be made. Capital funds have recently become exhausted and owing to the delays which have prevented full production being reached it will, in due course, be necessary to raise more capital, but as it is not intended to make an issue of shares immediately, loan facilities have been granted to the company by The Anglo American Corporation. A particularly interesting comment on the recent acquisition of Freddie's South No. 2 shaft, together with an area in its vicinity, was that discussions are taking place with Government authorities on the question of a downward adjustment of F.S. Geduld's lease formula.

A new shaft is to be sunk at Western Holdings to serve the western part of the mine. This will enable the eventual milling capacity to be increased from 125,000 tons to 150,000 tons per month. The estimated capital cost of the new shaft, together with the reduction plant extension and ancillary development programme, will cost approximately £3,800,000. In view of the company's high profit earning capacity, however, it is felt that this expenditure can best be met over the next four years from present resources rather than by raising new capital.

In contradiction of recent rumours concerning Loraine Gold Mines it is stated that development continued at the mine during the last financial year at a highly satisfactory rate. Moreover, operations were not hampered to any great extent by faulting or water. Metallurgical test milling has already taken place at the reduction plant and production is planned to commence in May at a rate of between 30,000 and 40,000 tons a month. The existence of uranium in payable quantities over extensive areas has also been established and application has been made to the Uranium Production Committee for the company to be accepted as a uranium producer.



■ UNDERGROUND DEVELOPMENT: Shaded areas indicate extent and direction of underground development up to December 31, 1954.

○ PROPOSED NEW SHAFTS: Approximate positions of proposed new shafts in the Welkom and Western Holdings mines, and of the proposed sub-vertical shaft in the President Brand mine.

---- PROPOSED NEW BOUNDARY between Free State Geduld Mines Ltd. and Freddie's Consolidated Mines Ltd.

COMPANY NEWS AND VIEWS

Central Mining Earns More and Pays More

With the recommendation of a final dividend amounting to 10 per cent on the issued ordinary capital of £4,000,000 in shares of £1, total distribution made by the Central Mining and Investment Corporation in respect of the year ended December 31, 1954, has been raised to 13½ per cent from 12½ per cent previously.

Year to Dec. 31	Group Profit £	Taxation £	Net Profit £	Dividends £	To Reserve £	Carry Forward £
1954	1,371,105	457,533	913,572	340,000	550,000	257,338
1953	1,168,899	214,384	954,515	302,500	630,495	233,766

Group profits before tax advanced from £1,168,899 to £1,371,105. This figure included revenue from dividends and interest of £1,010,143 as compared with £905,251 together with profits from share dealing of £447,251 as against £606,689 previously. Profits from the latter activity did not, however, suffer so severe a drop as would be indicated from these figures as the previous year's total included some exceptional items.

Lord Baillieu is chairman. Meeting, London, June 20.

Minerals Separation Makes Record Profits in Jubilee Year

Due mainly to higher dividends and interest which moved up to £244,460 from £180,648, Minerals Separation's total revenue in respect of the 50th year since its inception which ended on December 31, 1954, advanced sharply to £467,131 from £385,441 previously. A marked rise also took place in combined profits on trading to £222,671 from £204,793. After expenses depreciation, taxation, and other charges net profits for the year were £180,734 as against £123,308 during the preceding period. From this total, dividends of 20 per cent on the issued ordinary capital of £1,000,000 in 5s. stock units absorbed £113,750. This compared with 70 per cent on the previous issued capital of £250,000 in 5s. stock units which absorbed £96,250. A rise in dividend distribution equivalent to 10 per cent was thus made.

Closely identified with copper mining in Northern Rhodesia—it was under the company's auspices that the prospecting syndicate which became the parent of the Northern Rhodesian copper field was formed in 1921—Minerals Separation still maintains a very substantial interest in this sphere. However, during the past financial year the opportunity was taken of lightening the company's stake in Rhodesia which for some time has been considered to represent too high a proportion of total holdings. From the funds so realized, together with the proceeds of other sales, considerable investments in the U.S.A. and Canada were made.

But although the company's early prosperity closely reflected the success of its investment activities on the Copperbelt, the advance in trading profits over recent years clearly indicates the profitable entry which it has made into other industries. Indeed, to-day, its interests include a substantial participation in the progressive and world-wide Foundry Services flux making business, while through Mercury Securities they extend to banking and metal trading. The company also virtually owns the old established Howard Pottery Group which operates in Staffordshire, and J. W. Jackman Co. makers of foundry equipment.

Reflecting the growth character of its broadly based and expanding interests the 5s. stock units of Minerals Separation give a return of just under 6½ per cent at their present price of around 14s. 9d. xD. Mr. J. N. Buchanan is chairman. Meeting, May 25, London.

British Aluminium's Improved Order Position

Referring to the improved order position for semi-fabricated products of the British Aluminium Company which took place during the past financial year to December 31, 1954, Lord Portal of Hungerford, the chairman, stated in his speech to shareholders at the meeting, which took place earlier this week, that these better market conditions were being maintained. This was enabling the company to operate its rolling mills more efficiently.

During the past few years the company has tried to keep its prices for semi-fabricated products as low as possible in order not to affect the development of its business. In the face of increases in the cost of supplies and services profit margins on many products have in consequence been reduced to an unsatisfactory level. The company was, therefore, recently forced to increase prices of a wide range of its products.

Further details will be found in the chairman's speech reported on page 513.

Hartebeest Achieves 99.5 Per Cent Success for New Issue

Hartebeestfontein Gold Mining Co. has announced that in connection with the rights of shareholders to subscribe, during the month of March, 1955, for 3,600,000 shares of 10s. each at 16s. per share at the rate of two new shares for every three held, that 99.5 per cent of the new shares have been subscribed. The balance will be taken up by the underwriters.

BRITISH CONTROLLED MINING ORGANIZATION operating in Middle East have urgent Vacancies for :

- (a) Chief Accountant (Chartered preferred);
- (b) Mining Engineers (Metalliferous Outcrop);
- (c) Road Transport Manager (overseas experience essential);
- (d) Building Construction Manager (surveying qualification desirable);
- (e) Personal Secretaries (female), shorthand typing. Age limit 21-35.

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E. C. SMITH,
Principal.

April 27, 1955.

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ANGLO AMERICAN CORPORATION OF SOUTH AFRICA, LIMITED

(Incorporated in the Union of South Africa)

GOLD-MINING COMPANIES IN THE ORANGE FREE STATE

(All companies mentioned are incorporated in the Union of South Africa)

Extracts from the Statements by Mr. H. F. OPPENHEIMER, Chairman of the Companies

WELKOM GOLD MINING COMPANY LIMITED

During 1954 and the first few months of 1955, monthly tonnages milled were erratic and profits low. The causes of this were deep-seated, but since my last statement to shareholders much has been done to overcome the difficulties and important long-term plans have been drawn up for expanding production. Development results during the past year have been better than at any time since the mine started and the recent increase in the number of Natives in the service of the industry has removed for the time being what was a real problem during a large part of 1954. Altogether, the position of the company is far more satisfactory than it was a year ago.

Finance is referred to in the main body of the directors' report and again later in this review. Anglo American Corporation of South Africa, Limited, exercised their right on December 31, 1954 (a right which under the terms of the Agreement continued up to June 30, 1957) to convert their loan to your company of £1,500,000 carrying interest at 6 per cent. per annum into 1,000,000 shares at 30s. per share, thus relieving the company of a heavy burden in respect of interest. Shareholders will observe that interest payments amounting to £228,695 incurred during the year have been charged to capital, together with excess development costs. In view of the conversion of this loan into shares and the arrangements referred to later on, your company's liability under this heading will henceforth be reduced considerably. It is also intended that as the mine reaches a fully established basis, and becomes capable of full production, interest payments should be progressively debited against working profits and the amounts charged to capital diminished accordingly.

Perhaps the most serious shortcoming in the technical field this time last year was the lack of stope face—and consequent inflexibility in mining operations—caused by the unexpectedly large amount of water and faulting encountered in the early stages of opening up the mine. As I told shareholders in 1954, it was imperative to establish fresh points of attack. For this purpose No. 2 Shaft was deepened to allow development to take place on the 30, 32 and 35 levels; and No. 1 Shaft was equipped to handle ore from 30 level.

This work called for skill and ingenuity to avoid interference with the use of the shafts for normal operations on other levels, and the consulting engineers and all those associated with the operations are to be congratulated on their success in completing what was a slow, unpleasant and extremely difficult task. As new levels became available development ends were pushed out and stopes established, and the mine management is now in a far better position to carry out a balanced mining policy than it has been at any time in the past. We must, however, continue to press for a higher development footage and increased tonnages. These can be achieved, but not quickly.

Quite as important has been the rise in development values. The upward trend in values, which will have been noticed from the quarterly reports, has been due not to phenomenal results in any one section of the mine, but rather to steady improvements in widespread areas including, in particular, the western section up to the Arrarat fault system, and the section south of No. 2 shaft. In addition, I am pleased to say that good values have been exposed on 32 level east of No. 2 shaft. These encouraging development results have already begun to influence ore reserve figures which, compared with those of the previous year, show an increase not only in tonnage but of almost one dwt. in value.

LONG-TERM PLANS

It has now become possible to look further ahead and to make plans for the longer-term future. One of the main factors to be taken into account is the probability that, whilst ample tonnages of ore will be available to the present shafts for many years, the ventilation provided by the two shafts is not likely to be sufficient to allow the tonnage milled to rise much beyond 100,000 tons per month.

I have already referred to the Arrarat fault system. This system, after running south-west from the northern extreme

of the Welkom lease area, appears to swing south about mid-way on the Western Holdings boundary towards the point where the boundaries of the President Brand, President Steyn and Welkom mines meet. This faulting serves to cut off from the rest of the mine a fairly large wedge-shaped piece of ground in the south-western section of the Welkom lease area. The fault system is believed to throw the reef down to an average depth of over 4,000 feet on the west, thereby making this ground inaccessible from the existing workings, which, at the nearest point are less than 2,000 feet below surface.

Reef values to the south-west of the fault are expected to be similar to those encountered in the President Brand and Western Holdings mines, and higher than those so far exposed on the Welkom mine. The consulting engineers have accordingly put forward a recommendation, which has been accepted by the board, that twin vertical circular shafts should be started in this area in the near future so as to enable the milled tonnage of the mine as a whole to be increased beyond 100,000 tons per month and to improve the grade of ore mined. A borehole is being sunk to obtain further data, and, provided nothing untoward happens, shaft-sinking could start at about the middle of the year. Some of the ventilation capacity of the new shafts will be needed by the President Steyn and President Brand mines, which will, therefore, contribute towards the cost of sinking them.

It is estimated that the cost of the Welkom portion of the capital expenditure on sinking the shafts, together with preparatory underground development and extensions of the mill to 150,000 tons per month, will be of the order of £2,600,000. In considering methods of financing this expenditure, we have borne in mind that, whilst it is sound policy to use a considerable portion of profits towards capital expenditure during the period when no tax or lease payments have been made, the company has heavy loan commitments, and must be placed in a position that will enable it to pay dividends once working profits reach a reasonable scale. After considering all the implications, it was decided, subject to the necessary resolutions being passed increasing the capital of the company to accept an offer by the Anglo American Corporation of South Africa, Limited, which, as announced in the Press, is as follows:—

- To subscribe immediately for 1,250,000 shares at 22s. 6d. a share, the proceeds of this issue to be used in repaying drawings on existing loan facilities which, at the end of March, totalled £1,358,000.
- To provide fresh loan facilities of up to £2,500,000 until December 30, 1959, carrying interest at six per cent. per annum on amounts drawn.

In consideration, the Anglo American Corporation will be granted the right to subscribe for 1,250,000 shares at 27s. 6d. per share at any time up to December 30, 1958, the proceeds of this issue to be used towards the repayment of any amounts borrowed under (b) above.

This arrangement, apart from reducing interest charges, should provide the company with all the finance it requires for many years and shareholders will be asked to approve the necessary increase in the capital of the company at an extraordinary general meeting of the company which will follow the Annual General Meeting on May 24, 1955.

These are the main points on which I wish to comment this year, but there are one or two other matters which I would like to draw to the attention of shareholders.

Looking much further into the future, it will be necessary to exploit the eastern section of the mine, on which there is comparatively little information at present. The President Steyn mine is developing northwards from its No. 1 Shaft towards the Welkom boundary and we have arranged with that company to carry development on the 42 level into the south-eastern corner of our lease area. This will provide us with valuable information on long-term prospects of the mine and will give some indication of how this area should be opened up when the time comes.

The Welkom uranium plant started operating at the end of

January. At present it is treating slimes from Freddie's Consolidated Mines, Limited. Uranium values in this year's development have improved, but it is still too early to say whether treatment of slimes from the company's reduction plant for uranium will eventually become an economic proposition.

I mentioned at the start of this review that the native labour

situation had improved. All our planning is dependent largely on the availability of labour, and at present, despite two Press campaigns—one at the beginning of last year and one at the beginning of this year—we are still short of European labour. This is a national problem that faces not only us but almost every industry in the country.

LORAINÉ GOLD MINES LIMITED

Development has continued at your company's mine throughout the period under review at a highly satisfactory rate. Operations have not been hampered to any great extent by faulting, little water has been encountered and excellent progress has been maintained in opening up the mine. It has been the policy to drive forward rapidly with development in order to make available as soon as possible an adequate number of stope faces so that a steady and rising tonnage of ore can be supplied to the mill when production commences. A considerable measure of success can be said to have been achieved in that a total of 85,069 feet of development was completed during the year. The high rate of advance in development operations has also been maintained throughout the first quarter of 1955. During this period an average monthly footage of approximately 9,000 feet has been accomplished, which is a most creditable achievement on the part of all concerned.

The development has taken place on 46, 48, 50 and 52 levels at No. 1 Shaft and on 44 and intermediate levels to 52 level at No. 2 Shaft, and good progress has been made on all levels with very little interruption; the general direction of development has been north and south from both shafts, but the area explored at No. 1 Shaft now extends laterally over approximately 1,800 feet. The overall average values of the payable footage sampled during 1954 shows a decrease compared with the previous year of from 332 to 284 inch-dwt., but the percentage payability has increased from 55.5 per cent. to 72.8 per cent. and average values obtained during the first quarter of 1955 show a slight improvement. At March 31, 1955, the total footage driven underground since the commencement of operations amounted to 132,979 feet, of which 14,150 feet were payable, equivalent to 71.66 per cent. of the footage sampled at an average value of 290 inch-dwt. It is anticipated that the connecting haulage between the two shafts on 52 level will hole out early in the second quarter of this year.

The development operations have also established the existence of uranium in payable quantities over extensive areas and application has been made to the Uranium Production Committee for the company to be accepted as a uranium producer.

START OF PRODUCTION

The Reduction plant has been completed to a capacity of 75,000 tons per month, milling of ore for metallurgical test purposes has already taken place and official production is planned to commence in May of this year at a rate of between 30,000 and 40,000 tons per month. This is somewhat later than was anticipated in the circular sent to shareholders in September, 1954, but the deferment will assist in ensuring that adequate stope faces will be available during the first few months of production.

FREE STATE GEDULD MINES LIMITED

During 1954 extremely difficult conditions were met underground, and as a result, despite strenuous and exacting work by all at the mine, progress from a superficial point of view has been very slow. However, last year's work provided a great deal of valuable information and has placed the mine management in a position to advance into areas that are believed to be drier and less broken than those reached so far, whilst at the same time consolidating the position in areas where development has already taken place.

A considerable footage of development was done in 1954 in the vicinity of No. 1 Shaft, but owing to a relatively large number of small faults, the proportion of the footage on reef was small and few blocks of ore large enough for stoping have thus far been opened up. Having plotted the approximate location and throw of the faults from information obtained underground, work has for some time been concentrated on developing out through the faulted ground into areas which it is thought will be less disturbed by faulting. There is some evidence that this object has now been largely achieved and it

is hoped that development henceforth will be more productive from the point of view of exposing reef for stoping.

Development was carried out from No. 1 Shaft during the year on the 47, 49, 51 and 53 levels, a total of 43,043 ft. being driven; 3,010 ft. on reef were sampled of which 2,765 ft., equivalent to 91.9 per cent, proved payable at an average value of 708 inch-dwt. The results, from which these average values were taken, were mostly obtained in an area to the north-east of the shaft. Haulages and cross-cuts are now being driven to develop areas south and south-east of the shaft. In addition, the connecting haulage on 53 level is being pushed out eastwards, towards No. 2 Shaft, but progress has been retarded by the intersection of water-bearing fissures. Following the dewatering of No. 2 Shaft in 1953, 53 level at that shaft was sealed off and the haulage on 51 level is being advanced westward towards No. 1 Shaft. In due course an incline will be sunk from this haulage to hole with the haulage on 53 level from No. 1 Shaft.

Operations at No. 2 Shaft during 1954 had to be directed in

the first instance towards completing the installation of the conveyor belt station and the necessary ore pass systems, as well as equipping the shaft with adequate pumping capacity. The main pump station is now established with pumps capable of dealing with 5,000,000 gallons of water per day which provides a considerable reserve against further severe intersections of water. The development of cross-cuts and air-ways was thus delayed, but now that the preliminary work in the vicinity of the shaft has been accomplished, and several points of attack are available, it should be possible to advance at a rate comparable with that achieved in No. 1 Shaft area.

Development has been carried out on 43, 45, 47, 49 and 51 levels in this area but work has been restricted on all levels by broken and faulted ground carrying heavy quantities of water. Progress has been slowed down by the need to seal off water by cementation and by other precautions, but it is thought that the water occurrences are part of a major water zone in the shaft vicinity, and that when development is advanced out of this zone relatively better conditions can be anticipated.

Present indications are that the reef lying to the south of No. 2 Shaft will be less faulted and drier, and consequently it is intended to push forward rapidly into this area and to join up with the haulage on 41 level which has been driven northwards from Western Holdings. The haulage on 43 level south from No. 2 Shaft which is due to pick up the reef shortly, will be advanced towards the haulage from Western Holdings, and in due course a raise will be made to effect a connection. If operations go according to schedule, it should be possible during the ensuing months to make several raise connections and to open up a number of stoping areas south of No. 2 Shaft.

DEVELOPMENT RESULTS

During 1954 the total footage sampled in the vicinity of No. 2 Shaft, excluding development footage from Western Holdings 41 Haulage north, amounted to 500 ft. of which 495 ft., equivalent to 99.0 per cent., proved payable, at an average value of 769 inch-dwt. Shortly before the end of the year the 41 haulage North from Western Holdings No. 1 Shaft crossed over the boundary and development was carried out from that haulage in your company's property. The following values were obtained in boxholes and cross-cuts made from the haulage during 1954 and the first quarter of 1955; in each case only a small footage of reef sufficient for sampling purposes was opened up in order not to delay the advance of the main haulage.

	Footage sampled	Percentage payability	Inch-dwt.
Western Holdings Lease Area:			
2,000 ft. from F.S.G. Boundary	60	100	2,025
1,000 ft. from F.S.G. Boundary	10	100	7,518
1,000 ft. from F.S.G. Boundary	20	100	1,091
Free State Geduld Lease Area:			
Last quarter, 1954	260	100	2,134
First quarter, 1955	175	100	1,665

Thus development has disclosed very high values on both sides of the Western Holdings boundary and a reasonable freedom from faulting and results near No. 2 Shaft have been much better than could have been expected from the result

obtained from Borehole Tochgekregen No. 1 which is nearest to the shaft. These values, supported by the evidence of Geduld No. 1 and Geduld No. 2 and Mijannie No. 1 boreholes, give strong grounds for the belief that the southern part of our property will prove to be exceptionally rich, and the serious delays which have occurred during the last two years, whilst undoubtedly increasing the capital cost of bringing the mine to production, should not in my opinion be regarded as affecting significantly the long term prospects of the mine.

NEW FINANCE

The capital funds raised have been exhausted, and at March 31, 1955, the amount on loan from Anglo American Corporation was £1,808,800. Owing to the further delay in reaching production it will be necessary in due course for the company to raise more capital. Advantage is, therefore, being taken of the annual general meeting to hold an extraordinary general meeting immediately afterwards at which a resolution will be submitted to members increasing the authorized capital of the company from £2,250,000 to £2,500,000, by the creation of 1,000,000 new shares of 5s. each. It is not intended to proceed with an issue of shares immediately, and to finance operations in the meantime, Anglo American Corporation of South Africa Limited, has agreed to grant to your company temporary loan facilities of up to £3,500,000 in all, bearing interest at 6 per cent. per annum on amounts drawn.

Shareholders will be aware that since the end of the year the company has purchased from Freddie's Consolidated Mines, Limited, the No. 2 south shaft of that company together with its ancillary equipment and buildings and approximately 1,300 claims on the southern boundary of the Freddie's Consolidated Mines, Limited, lease area, for a cash consideration of £1,500,000 which has been utilized by the Freddie's company in the subscription for 300,000 shares in your company. The south reduction plant of Freddie's Consolidated Mines, Limited, is not included in the assets acquired. The Freddie's shaft will be valuable as a source of extra ventilation that will be required later to enable the mine to reach a full rate of production, and in giving access to the northern areas. In terms of the arrangement, the shaft will not be taken over for some months so that the Freddie's company can mine the payable zones representing the ore reserve that has already been blocked out, but during this time they will also, on behalf of your company, develop out southwards towards the boundary. It is intended to advance the Freddie's south haulage on 55 level in the direction of your company's No. 1 shaft and in due course to make an incline raise to connect with the haulage on 53 level which will be driven north-east from that shaft. The reef so far exposed by Freddie's Consolidated Mines, Limited, in the vicinity of the shaft has proved to be of low average grade, but operations have been restricted to an area comparatively small in extent. It is intended in due course to investigate the remainder of the ground acquired.

Discussions are taking place with Government authorities on the extent to which the capital expenditure on Freddie's south No. 2 shaft and equipment will rank for amortization in the hands of Free State Geduld Mines, Limited, and on the question of a downward adjustment of the Free State Geduld lease formula.

PRESIDENT BRAND GOLD MINING COMPANY LIMITED

The operating results for the five months during which this mine was in official production last year are tabulated in the Annual Report, and there is no need for me to call special attention to them here or to comment on the steady and substantial increase in profits that has been maintained during the first few months of 1955. The fact that it proved possible to bring the mine to profitable production so early on the basis of the limited tonnage available from only one shaft is in itself the measure of the richness of ore disclosed in development. Stockholders will appreciate that the high percentage payability of the reef is the complementary factor that has assisted in building up at this stage in the mine's life the highly satisfactory mining position disclosed by the ore reserve figures. It may be of interest to know that as far as can be ascertained, the ore reserve value of 21 dwt. at the estimated stoping width of 48 inches is the highest ever recorded on a scheduled gold mine in South Africa.

I am glad to say that current development work has continued to indicate that the northern half of the mine at least is an area of probable overall enrichment. I said last year that mining experience warned against drawing hasty conclusions and it is prudent for me to say so again, but I would like to

repeat here the basic facts as they are known in the light of an additional 12 months' work underground. Development has now been accomplished on reef on six levels extending on dip from the 38 level near the St. Helena Gold Mines, Limited, boundary on the west to the 46 level which on plan is to the east of No. 1 Shaft. Development on the strike of the reef, which runs approximately north and south, covers a mean distance of about 4,000 feet, which means that a block measuring approximately 4,000 ft. by 4,000 ft. has been substantially proved.

This, of course, represents only a small portion of the lease area, but encouraging results have been obtained at the extremities of the development so far accomplished. The connecting haulage driven on 46 level from No. 1 Shaft to meet the haulage on the same level advancing from No. 2 Shaft intersected the reef at a point approximately 5,500 feet south of No. 1 Shaft, and the 170 feet sampled assayed 182.32 dwt. over 5.12 inches or 933 inch-dwt. at a payability of 100 per cent. The 38 level north on the boundary of St. Helena Gold Mines, Limited, has developed 215 feet on reef, all of which has proved payable, averaging 3,371 inch-dwt. This reef development has taken place some 4,200 feet north-west of No. 1 Shaft.

While results in individual development ends should naturally be treated with caution, I feel that the indications obtained from this farspread development are significant. When read in conjunction with Boreholes W.8 and W.9 and the development results obtained in the President Steyn Gold Mining Company, Limited, No. 2 Shaft area, I feel that even a conservative assessment of the northern half of the property must be of a highly favourable nature.

During January the uranium plant at President Steyn Gold Mining Company, Limited, was brought into operation, treating the combined tonnage from your mine and the President Steyn mine. Practically no teething troubles were experienced when the huge plant started and it has continued to operate satisfactorily ever since. In due course the combined tonnages of the two mines will exceed the capacity of this plant and the surplus slimes will be pumped to Welkom Gold Mining Company uranium plant for treatment. Profits were earned by the company from the first month of uranium production and should increase now that plant retention has been met and the grade and tonnages of slime are improving.

NEW SUB-VERTICAL SHAFT

I would like to turn now to certain capital work which we consider should be undertaken in the immediate future. The holing of the connecting haulage between the two shafts which took place during March will enable milling tonnages to be built up gradually. Stockholders are aware, however, that No. 2 Shaft was stopped at a depth of 4,800 feet, approximately 1,200 feet above the reef at that point, and for this reason it will be possible to establish only three mining levels from the existing shaft. In order to gain access to the deeper levels it is intended to proceed immediately with the sinking of a sub-vertical shaft system consisting of twin circular shafts which will be sunk from the 46 level, about 1,500 feet north-west of No. 2 Shaft, to a depth of 7,250 feet below surface, with a bottom working level at 7,100 feet.

The consulting engineers have pointed out that the ventilation difficulties attendant on mining at these depths will necessitate the use of the whole of the upcast capacity of the existing No. 2 Shaft to provide for the requirements of the sub-vertical system. It will be necessary, therefore, for No. 1 Shaft to assume responsibility for upcasting the air required for working the upper levels in the No. 2 Shaft area. In order to ensure in turn that No. 1 Shaft area, which will comprise the

whole northern third of the property, is able to build up and maintain tonnages of approximately 30,000 tons per month, the consulting engineers have recommended that the Company join with the President Steyn and Welkom Gold Mining Companies in sinking, on the latter company's property, a joint shaft system of sufficient size to provide for the ventilation requirements of all three mines. The joint shaft system will consist of twin circular verticals sited 150 feet apart and sunk from surface. It is intended that this work should be put in hand at the middle of this year and it is hoped that sinking will be completed in 1957. By this time ventilation connections will have been driven from No. 1 Shaft and, provided work goes according to schedule, the sinking of the sub-vertical system at No. 2 Shaft should also be finished by then.

The consulting engineers estimate that following on this work and with the additional ventilation capacity available the mine should be able to mill at a monthly rate of 90,000 to 100,000 tons per month during 1958, and they accordingly recommend that work should be started this year to extend the reduction plant's capacity from 75,000 tons per month to 125,000 tons per month.

The total cost of No. 2 sub-vertical shaft system, together with your company's proportion of the cost of the joint shaft with Welkom and President Steyn and the cost of the extension to the reduction plant, is estimated at £2,300,000. In addition, there will be capital expenditure on excess development expected to total £560,000 in 1955. In view of the company's high profit earning capacity, your directors at present feel that this expenditure can best be met by drawing on the company's own resources. Estimates indicate that the mine will not incur full lease or tax payments for a number of years and that during this period it will be possible to appropriate considerable sums from profits to meet capital expenditure and make reasonable distributions by way of dividend. The amount on temporary loan from Anglo American Corporation at March 31, 1955, was £908,000. To provide the further finance necessary for the work on hand, your board has decided to accept an offer from Anglo American Corporation to grant loan facilities of £2,000,000 in all, bearing interest at 6 per cent. per annum on amounts drawn, and at 1 per cent. per annum on the un-called balance. All amounts drawn under these facilities will be repayable in full by June 30, 1958, and the company has the right at any time to reduce the total amount of loan facilities available on giving three months' notice to Anglo American Corporation.

WESTERN HOLDINGS LIMITED

For some time now a great deal of public attention has been focused on development results obtained in the vicinity of 41 Haulage North from the Company's No. 1 Shaft towards and across the Free State Geduld boundary. The following is a table of the published figures:

Distance from Western Holdings No. 1 Shaft	Position of Cross-cut or Boxhole		Footage Sampled	Percentage payable	Payability Inch-dwt.
	Distance from Free State	Geduld Boundary			
Feet	Feet				
2,500	2,000	60	100	2,025	
3,300	1,000	10	100	7,518	
3,300	1,000	20	100	1,091	
3,800	500	70	100	1,562	
4,400	*	435	100	1,945	

* In Free State Geduld Area.

Although the footages are small these results, read in conjunction with the values obtained near Free State Geduld No. 2 Shaft and the Geduld No. 1 and No. 2 Boreholes, certainly appear to confirm that there is a zone of exceptional enrichment extending over a considerable area north of Western Holdings, No. 1 Shaft. The haulage has now advanced a very long way from the shaft and has become difficult to ventilate. It is, therefore, improbable that much more development on reef in the vicinity of the Free State Geduld boundary will take place until the haulage south from Free State Geduld No. 2 Shaft on 43 level connects with Western Holdings 41 Haulage North later this year. This is expected to take place in the latter half of the year.

Another satisfactory feature of the development north from Western Holdings No. 1 Shaft has been the comparatively small amount of faulting and water that have been encountered. This had an important bearing on operations during the last year and will continue to influence them. It will be remembered that I referred last year to the faulting that had interfered with the establishment of stope faces in the central and south-

ern sections of the mine and to the steps that were being taken to transfer development work to alternative areas as quickly as possible. As a result of the favourable conditions north of No. 1 Shaft, to which I have now referred, it was made possible to carry out this task with a considerable degree of success and several highly payable stope connections have been established in that area. Unfortunately, in the No. 2 Shaft area, intricate faulting, encountered between 38 and 43 levels, continued to hinder development work and limited the tonnages that could be mined in the area. This accounts largely for the somewhat disappointing rate at which tonnages milled have increased during the past year. The Consulting Engineers are satisfied, however that a stage has been reached where there are enough stope connections available in the area—and a sufficiently wide knowledge of the faulting has been built up—to allow the shaft to contribute an increasing tonnage to the mill.

All things considered the mine is now in a healthy condition. Profits are being earned on a substantial scale, ore reserves have doubled and development operations have been extended over a wide area. There are good prospects of a steady improvement in tonnages milled and profits this year.

PLANS TO INCREASE PRODUCTION

The consulting engineers have recently come forward with long-term plans for the mine and these have been accepted by the Board. As shareholders are generally aware, mining and development are confined at present to a strip extending from the northern boundary to a point about 3,000 ft. from the southern boundary of our property; on the dip of the reef development extends about 3,000 ft. and covers work between the 36 and 43 levels. The latter level is the effective bottom working level at present, but the shafts will be able to cater, by means of winzes, for mining on the 45 level. The consulting engineers estimate that the existing shaft systems will not be able to provide a milling tonnage much in excess of 100,000 tons a month and recommend that, in order to bring the mine to a 150,000 tons a month output on a balanced basis, a third

shaft should be sunk in the western portion of the mine. The additional ventilation capacity thus provided will also be used in due course to supplement the ventilation provided by the existing shafts; this, in turn, will enable mining in the deeper levels to the east to take place when the stopes in the existing mining areas become exhausted. Although exploratory cross-cuts to gain further information in regard to the eastern area will probably be started next year, I should add that actual stoping operations in this portion of the mine will not necessarily take place for a number of years. The shaft will be so placed and designed as to enable it to cater for the remainder of the lease area to the north, south and west.

It is proposed to start work on the shaft during the second half of the year. Two circular verticals will be sunk 150 ft. apart to a depth of 4,200 ft. In the meantime, work will be put in hand to extend the treatment capacity of the reduction plant to 125,000 tons a month. In due course the capacity of the plant will be increased to 150,000 tons a month, and provided the shaft sinking and development programmes go according to plan, it should be possible to mill tonnages of this order, probably during 1959.

It is estimated that the capital cost of the new shaft system,

together with the ancillary development programme, extensions to the reduction plant, Native hostels and buildings will amount to approximately £3,800,000. In view of the company's high profit-earning capacity, your directors feel that this expenditure can best be met over the next four years by drawing on the company's own resources rather than by raising new capital. On the basis of present estimates the mine will not incur full lease or tax payments for several years and the board considers that during this period the company will be able to finance capital expenditure from profits and, at the same time, make reasonable distributions by way of dividend. The amount on temporary loan from Anglo American Corporation at March 31, 1955, was £1,389,000. To provide the further temporary finance necessary for the work on hand, your board has decided to accept an offer from Anglo American Corporation to grant loan facilities of £2,500,000 in all, bearing interest at 6 per cent. per annum on amounts drawn, and at 1 per cent. per annum on the uncalled balance. All amounts drawn on these facilities will be repayable in full not later than December 31, 1958, and the company has the right at any time to reduce the total amount of loan facilities available on giving three months' notice to Anglo American Corporation.

PRESIDENT STEYN GOLD MINING COMPANY LIMITED

Most encouraging progress has been maintained both in mining and milling operations and in development. This mine has been fortunate in its early life as a producer in that relatively moderate faulting and occurrences of underground water have allowed development and the establishment of new stope faces to proceed rapidly, as a result of which a steady and substantial rise in the milling rate has been possible. Tonnage increases have been accompanied by a steady improvement in the grade of ore, and the sound mining position that has been built up is reflected in the excellent year end ore reserve figures.

During January of this year, the uranium plant was brought into operation. Great credit is due to all concerned with the erection of the plant, though here, again, we undoubtedly benefited from the experience of others. Practically no teething troubles were experienced when the huge plant started, and it has continued to operate most satisfactorily ever since. At present it is treating the combined tonnages of the President Brand and President Steyn mines. In due course these combined tonnages will exceed the capacity of the plant, and the surplus slimes will be pumped to Welkom Gold Mining Company uranium plant for treatment. Profits were earned by the Company from the first month of uranium production and should increase now that plant retention has been met and the grade and tonnages of slime are improving.

Stoping operations at the mine have followed conventional lines except in certain stopes at No. 1 Shaft where the reef is closely overlain by a thickness of shale that does not permit of undercutting. In these stopes a method of semi-resue stoping has been adopted which involves packing approximately 30 per cent. of the shale underground. By this means a milling width of approximately 46 inches can be maintained which is very satisfactory.

Over the past few months considerable thought has been given to expansion of production at the mine. As shareholders know, the mine at present has two shafts. No. 1 Shaft has a bottom working level at 4,200 feet, and, as the reef there dips from west to east, the shaft will be able to serve the whole of that portion of the northern third of the mine lying to the west of the shaft. No. 2 Shaft, whose bottom working level is at 4,800 feet, can serve roughly that part of the central third of the mine lying west of the shaft. With the heat conditions prevailing underground in the Orange Free State, it is not expected that the ventilation provided by these two shafts will be enough to permit much more than 100,000 tons per month to be milled; and, in view of the progress that has been made already in building up the tonnage milled, it is felt that immediate steps should be taken to increase the ventilation available in the northern section. For this reason it has been agreed that the company will join with the President Brand and Welkom mines in sinking a shaft system on the south-west corner of the latter's property. The joint shaft system will consist of twin circular verticals sited 150 feet apart and sunk from surface, and it is

intended to start shaft sinking during the middle of the year. This work should be completed during 1957. In the meantime a connecting haulage to the new shaft will be driven from the company's No. 1 Shaft on one of the upper levels. As President Steyn will require only ventilation capacity from the shaft and not hoisting capacity, the company's portion of the cost of the new shaft will be relatively low.

Apart from its value in enabling the tonnage milled to be increased, the additional ventilation from the new Welkom shafts will make available air for the development of the deeper areas east of our No. 1 Shaft.

Our reduction plant is already capable of milling 125,000 tons a month and it is intended to increase its treatment capacity from 100,000 tons a month to 125,000 tons a month this year.

Before turning to finance I should also mention that the company has agreed to undertake certain exploratory work for Welkom Gold Mining Company in the south-eastern portion of that company's property; this work will not interfere with the existing development programme and will be put in hand shortly.

Our proportion of the cost of sinking the new Welkom shafts, together with the cost of extending the treatment section of our reduction plant to 125,000 tons per month capacity, is likely to be of the order of £600,000. Whilst this work is being undertaken, there will be additional capital expenditure on other items, including excess development charged to capital. This additional capital expenditure is expected to total about £550,000. Although we will be justified in approving substantial sums to capital expenditure and to repayment of loans during the period when no taxation or lease payments are due by the company, the extent to which the company financed by loans is considerable and the directors are of the opinion that further funds should be raised by means of a share issue to reduce existing temporary loans and finance future capital expenditure. The terms of the issue will not be decided upon until later, but, in the meantime, to enable this proposal to be carried out, shareholders will be asked to approve an increase in the company's capital at an extraordinary general meeting of the company to be held immediately after the annual general meeting on May 24, 1955.

SHORTAGE OF LABOUR

The mine, in common with others in the Orange Free State, has experienced difficulty in obtaining adequate numbers in most categories of European labour. In addition, quite apart from numbers, increased mechanization calls for more highly skilled men, and in this respect, too, we are constantly in difficulties. It is hoped that large-scale recruiting campaigns will help to meet the numerical shortage and that more intensified training will reduce the shortfall in skill; but I feel it is important that attention should be drawn to a factor that could limit the progressive development of mining in the Orange Free State.

THE BRITISH ALUMINIUM COMPANY

INCREASED MANUFACTURING AND TRADING PROFIT

The annual general meeting of The British Aluminium Company, Ltd., was held on May 3 at Grosvenor House, Park Lane, London, W., Marshal of the Royal Air Force, **The Rt. Hon. Viscount Portal of Hungerford, K.G., G.C.B., O.M., D.S.O., M.C.** (chairman of the company), presiding.

The chairman said: Ladies and Gentlemen,—The Directors' Report and Accounts have been circulated to you, and I presume you will wish me to take them as read. The consolidated income for the year after tax amounted to £733,821, which compares with £409,699 for the previous year.

In previous addresses I have given considerable space to the progress of activities which have been proceeding in a normal way. Since Shareholders will be receiving a copy of the Company's History which has just been completed, I am proposing to take this opportunity to make my remarks more concise and confine myself to activities and figures which seem worthy of special mention.

LEVEL OF COSTS HELD

At our alumina works, technical developments have not only increased the level of output but have also helped to hold the level of costs against rising charges for wages, materials, services and freights.

Our reconstruction plans at Kinlochleven and Lochaber are nearing completion, and our metal output for 1954 exceeded that for 1953 despite the loss of capacity from Foyers, which has now been completely converted to the manufacture of Super Purity aluminium and is operating well.

Our works at Vikeland in Norway, which also produces Super Purity aluminium, achieved a record production and substantial quantities of this metal have been exported to the United States and elsewhere. In addition, consumption in the home market increased steadily.

During the year under review there was a progressive improvement in our order position for semi-fabricated products, which has contributed to the better figures that I am able to put before you. I am glad to say that these market conditions are being maintained, and consequently we are able to operate our rolling mills more efficiently.

The price of ingot was increased from £150 to £156 per ton on January 1, 1954, and again to £163 per ton on January 1, 1955. During the last few years we have tried to keep our prices for semi-fabricated products as low as possible in order not to affect the development of our business; but in doing so in face of increases in the costs of supplies and services our margins of profit on many products had been reduced to an unsatisfactory level. We were therefore forced recently to increase the prices of a wide range of our products.

Good progress has been made in the erection of our new extrusion works at Latchford, and we expect to go into production there about the middle of the year.

SUBSIDIARY AND ASSOCIATED COMPANIES

Turning to our subsidiary and associated companies, the Aluminium Corporation Limited made an excellent recovery from the adverse trading conditions reported in 1953. The general improvement throughout the industry affected in greater or lesser degree all our other associated interests. I am glad to be able to say that the Aluminium Manufacturing Company Limited, of Calcutta, which has been through a very difficult period, showed better results for the year than we had hoped for, although working on a much reduced scale.

Since the end of the year we have purchased from The Distillers Company Limited a majority interest in Magnesium Elektron Limited, which, in addition to manufacturing magnesium ingot, holds a number of valuable alloying patents in relation to that metal and manufactures the metal salts required in these alloying processes. We look to this new interest to broaden the basis of our business, and also greatly welcome this association with The Distillers Company. I am glad to be able to tell you that Major C. J. P. Ball has consented to remain as Chairman of Magnesium Elektron Limited. His long experience of the business will be of the greatest value to the company.

After lengthy negotiations we have recently succeeded in disposing of our interest in the Martigny-Orsières Railway. The amount of work involved has for long been out of relation to the benefits accruing, and we feel that it is more satisfactory for all concerned that this Railway should be owned and operated by local interests.

Our exploration work for bauxite and hydro-electric power has continued energetically but there is nothing of special interest which I am able to report at the present time. We are, however, satisfied with the progress made in various directions.

The alumina plant and aluminium reduction works at Bell Bay, Tasmania, which is the property of the Australian Government and in connection with which we are acting as technical advisers, started to produce alumina recently, and it is expected that production of metal will begin later in the year.

Development work has proceeded actively in a number of fields, and has been directed towards new uses and the wider expansion of existing uses. Aluminium plays quite an important part in the chain of processes leading up to the use of atomic energy as a source of power and in the production of radio-active products. The recently announced programme for nuclear power generating stations in this country and the prospect that this type of plant may ultimately be a major heavy engineering export should mean a substantial new demand for our products.

GROWING INTEREST IN ALUMINIUM

There is a growing interest in aluminium for railways, though so far mostly for equipment made for export. There is also ample evidence of the advantage to be gained from aluminium construction and there should be many opportunities for using it profitably in rolling stock, electrification, and building in the course of the modernization announced by British Railways.

The use of aluminium continues to make progress in road transport vehicles for both goods and passengers. There was increasing interest in chassisless construction during 1954 and our development engineers collaborated in the design and construction of the first welded chassisless 8-ton platform lorry. The integral system of construction is now recognized as giving the most efficient vehicle and uses up to 30% more of our materials than an aluminium body on the traditional steel chassis.

The demand for large coils for pure aluminium strip for foil rolling increased during the year and now provides a substantial load for our high-speed strip mills at Falkirk. We have established a good reputation for this product which should enable us to obtain a high proportion of the new business expected from further expansion of foil production.

Marine and building applications continue to be valuable outlets for our products and the prospects of expansion in the building trade are particularly interesting as prefabrication and other methods of rapid construction are adopted for large buildings, factories and power stations.

Continuing our policy of equipping the rolling mills with a full range of finishing equipment, we have laid down at Falkirk a unit for the continuous anodizing of coil strip. Our ability to supply coiled material with this finish should prove of value for packaging and other purposes.

Our research has continued in a number of fields, and apart from achievements in other more fundamental spheres of activity, has greatly assisted our development staff in the work to which I have referred above.

FINANCIAL RESULTS

Turning now to the Accounts, I am pleased to say the Manufacturing and Trading Profits of £1,999,633 is £1,117,516 greater than last year owing largely to the increased volume of sales of our semi-fabricated products to which I have already referred.

The Consolidated Balance Sheet does not call for any special comment as the only substantial variations from the previous year are either in the transfers from the Profit and Loss Account to the various Reserves and Provisions or are those normally to be expected from increased trading.

When we add to the net income of the Parent Company the amount brought forward from the previous year and deduct the appropriations and provisions set out in the Directors' Report, we are left with the sum of £848,602. After taking into account the dividend for the year on the Preference Stock, we recommend a Final Dividend of Eight per cent. on the Ordinary Stock which, with the Four per cent. already paid, makes Twelve per cent. less Tax for the year.

This leaves £469,102 at credit of Profits and Loss Account of the Parent Company; an increase of £18,756.

The report and accounts were adopted.

MINERALS SEPARATION, LIMITED

RECORD RESULTS

BOARD'S SOUND INVESTMENT POLICY

MR. J. N. BUCHANAN'S STATEMENT

The Fiftieth Annual General Meeting of Minerals Separation Limited will be held on May 25, at the Chartered Insurance Institute, 20 Aldermanbury, London, E.C.

The following is an extract from the review by the Chairman, **Mr. J. N. Buchanan**, which has been circulated with the Report and Accounts for the year ended December 31, 1954.

The two principal features of the Balance Sheet for the year ended December 31, 1954, appearing for the first time are: (i) the issued capital of £1,000,000, and (ii) the £250,000 Debenture Stock. As to (i), this is the result of the free issue made last year to existing stockholders in the proportion of three new 5s. units to every holder of one such unit. As to (ii), the Company is developing more and more towards the character of an Investment Trust Company, and the creation and issue of Debenture Stock is in keeping with the common and well-tried practice of such institutions. The Trust Deed creating the Debenture Stock authorizes an amount up to £1,000,000. Of this, we issued at the end of last year, £250,000, and in the current year another £250,000, bringing the total at present issued to £500,000. This leaves a further figure of £500,000 which may be issued if and when conditions for the issue and opportunities for the investment of the money appear favourable.

INVESTMENTS

With regard to our investments, we have reduced our very large shareholding in the Rhodesian copper field. This implies no weakening in our confidence in the copper-mining industry in general, nor in Rhodesia in particular. Out of the money realized from the Rhodesian and other sales, we have made considerable investments in equities in the U.S.A. and Canada. While, as I have said, our tendency is to move more towards the character of an Investment Trust company, we still retain and shall retain features which distinguish us from the more orthodox companies of that nature. I refer not only to our large participation in Rhodesia, but also to the substantial individual investments we have in our subsidiary and allied Companies. Most of these represent bigger individual investments than would be looked for in the usual Investment Trust Company. Our experience leads us to believe that it is a sound policy to hold substantial sums in companies that we either control or with which we have so close an association that we are fully conversant with their day-to-day progress.

Turning now to the Accounts, the profit shown in the consolidated profit and loss amounted last year to £413,000, as against £337,000 in 1953, and £341,000 in 1952. The 1952 figure was the highest recorded in the Company's history until this year, so that the advance to another new record has, as you see, been substantial. In view of these results we consider it reasonable to recommend a final dividend of 15%, making 20% in all for the year. This is equivalent to 80% on the old Capital, and compares with 70% paid on that capital last year. This distribution will absorb a lower percentage of the profits than did the dividend paid last year.

RHODESIA

In Rhodesia, another successful year was recorded, and all our three principal holdings, namely Rhokana, Nchanga and Mufulira, paid satisfactory dividends. In the case of Mufulira, a special dividend was declared in connection with the hiving-off of Chibuluma and other mines, as referred to in the Direc-

tors' Report. Since the turn of the year, the strike of the Africans employed at the Mines considerably interfered with production for the first two months; with the higher price of copper, however, it is not anticipated that the profits for the year will be unduly affected.

FOUNDRY SERVICES GROUP

The Foundry Services group had another successful year. Activity in the foundry industry improved, particularly during the latter part of 1954. As a result, business in the United Kingdom showed a more satisfactory turnover. It was, however, in the overseas business that a marked increase took place. The circle of satisfied Fosco users increased, and is increasing; and Fosco products are now used in more than forty different countries. In order to ensure that the products of the group can be made readily available and at reasonable cost to foundries in their own particular countries, since the end of the war the policy of local associated manufacturing companies has been progressively followed. The group now has seven such companies, situated in Austria, Canada, France, Germany, Italy, South Africa and the U.S.A. All made good progress and generally the turnover is expanding. The American company has been transferred from New York to Columbus, Ohio, which is a more convenient centre for its activities. The reorganization there is now more or less complete, and the prospects in that country of a steadily increasing turnover and satisfactory profits during the coming years are promising.

Jackman's trading for the year under review has again been satisfactory, with total sales slightly above last year and profit margins maintained. As anticipated last year, an additional works bay was completed, and came into production in August. Further works extensions are under consideration. The order book is at present in a healthy state, despite increasing competition both at home and abroad, from German and other sources.

HOWARD POTTERY GROUP

The reorganization of the Howard Pottery group referred to last year is now well advanced. This has included closing down the Tea and Dinner Ware Works which had been unsatisfactory for several years. Export conditions continue difficult, and designs and prices are continually under review to ensure meeting increasing competition. It has so far been possible to keep all works running at maximum production, and if this can be continued, profits for the year should be higher than for the year under review.

MERCURY SECURITIES

I explained last year that Mercury Securities now owns all the equity of S. G. Warburg and Co. except for a small minority holding, and Warburgs in turn hold nearly all the equity of Brandeis Goldschmidt. As may be seen from the Report published last September for the year ended March 31, 1954, Mercury Securities, in which we have a 20% interest, had a successful and prosperous experience. We retain our full confidence in the Company, and highly value our association therewith.

In conclusion, I wish to record on your behalf and that of the Board our grateful appreciation of the efficient services rendered by all in our group and in the associated companies, which have enabled us to put before you the satisfactory results for the year under review.

METALLURGICAL ASSISTANT required by Mining Company in India. Applicant should hold a recognized metallurgical degree and preferably be single. Salary starts at £675 p.a. (inclusive of Overseas Allowance) rising to £725 in the third year, with cost-of-living and servant allowances of £141 p.a. for a bachelor. In addition an annual bonus is paid, and a Provident Fund is in operation. Three years' contract, with leave on full pay after 24 years in India. Free furnished accommodation with fuel and light. Apply giving full particulars to Box 916, Walter Skinner Ltd., 20 Copthall Avenue, London, E.C.2.

TECHNICAL MINING ASSISTANT required by Mining Company in India. Applicant should hold a recognized mining degree and be single. Salary starts at £675 per annum (inclusive of Overseas Allowance) rising to £725 in the third year, with cost-of-living and servant allowances of £141 per annum. In addition an annual bonus is paid and a Provident Fund is in operation. Three years' contract, with leave on full pay after 24 years in India. Free furnished accommodation with fuel and light. Apply giving full particulars to Box 928, Walter Skinner Ltd., 20 Copthall Avenue, London, E.C.2.



Discourse on Drilling Rock

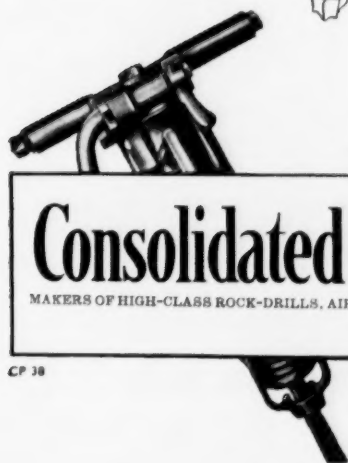
There must still be quite a lot to learn about rock-drilling, because there are many schools of thought on methods of approach, techniques, and equipment. But with any method the important feature is the final cost.

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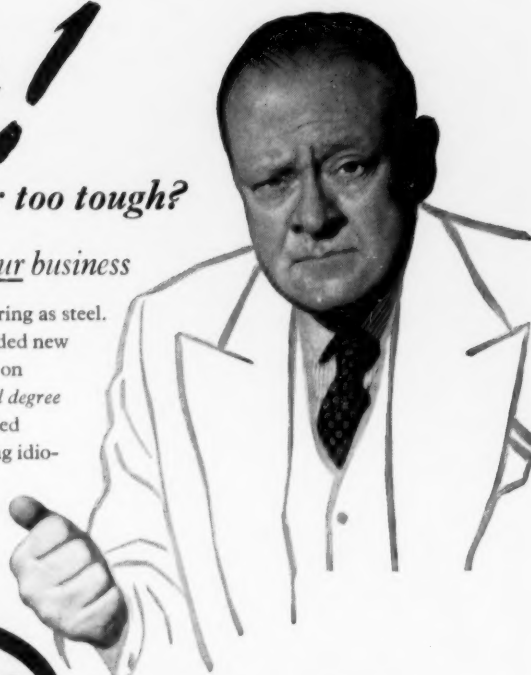
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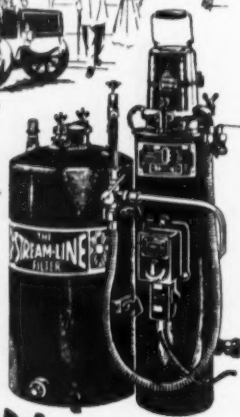
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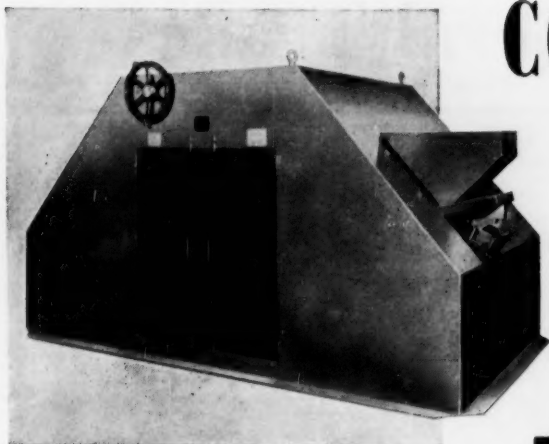
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